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ABSTRACT

The study organized a large data archive gathered on 718 children with severe language disorders over 8 years. Descriptive data were categorized as demographic/background, physical/developmental, social/personality, and language/academic characteristics; and then analyzed for the total group, by sex, and by three age cohorts, allowing a broad description of this group of children. Sets of descriptor variables in six domains were identified from program records and were used to predict language performance at program entry and relative language improvement over 2 to 3 years. Age was the strongest predictor for all analyses. In general, the primary research factors in the study (42 variables representing IQ, socioeconomic status, physical/neurological and social-emotional background) failed to account very well for either language performance at program entry or for relative language gain. In prediction of pretest language performance, IQ and physical factors played the strongest role. The two factors contributing significantly to prediction of relative gain were IQ (although suprisingly weakly) and social-emotional status. Characteristics of those children who progressed most in the program were identified. Additional information was presented bearing upon policy issues such as validity of the program model and streamlining of diagnostic and data keeping procedures. (Author)

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Final Report

Project No. 44 3AH 800 48
Grant No. G00 7803308

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CORRELATES OF LANGUAGE DEVELOPMENT IN LANGUAGE DISORDERED CHILDREN: AN ARCHIVAL STUDY

November, 1979

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

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by

Teris K. Schery

Claremont Graduate School: 1980

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CHAPTER I

BACKGROUND TO THE STUDY

Most children learn language quite naturally as a part of growing up and are competent language users by their earliest school years. Indeed, the human brain is uniquely organized to learn language and, except in cases of extreme deprivation, will do so in a remarkably predictable sequence and at an astonishingly rapid rate. The decades since Noam Chomsky published Syntactic Structures (1957), in which he first described the universal rule-based nature of language, have been filled with psycholinguistic research which has confirmed and elaborated the magnitude of the language-learning task. The behaviors that parents have delighted in--first words that only they recognize, early sentences peppered with baby talk, apparent mistakes such as calling the store manager "Daddy," or claiming to have "runned home fast"--all turn out to be important milestones that indicate the child's success in discovering patterns in his world, patterns that can be marked by language.

Teachers, too, rarely appreciate the abilities they take for granted in their young students. Rather, they tend to be sensitized to "errors" in the language code. Concern for teaching correct verb tenses, when to say "they" versus "them," or how to distinguish s from sh in a listening skills lesson, can obscure the truly miraculous learning feat already accomplished by any child of five or six who is ready for such instruction. And the fact remains that, by and large, most children, regardless of the country in which they are born, the size of their family, or the circumstances of their upbringing, will be ready to learn these or similar linguistic refinements of their native tongues by about their sixth or seventh year. This biological bias toward language acquisition (Lenneberg, 1967) is so strong that, if a child with normal cognitive ability (and a relatively normal social environment) fails to learn language within the normal time frame, a serious dysfunction may be presumed. In our society, as in most, such a dysfunction carries with it important social and educational implications.

The task of providing appropriate educational environments for children with language learning deficits is certainly the most far reaching problem of special education in America. Some children are identified early in their lives and provided with special learning environments from the onset of their educational years. The two largest groups of this type are the deaf and the mentally retarded. Such children most certainly display language disorders, and both types of children will require special educational planning aimed at the development of communication skills. Another group of children, considerably smaller in number, can be identified from early childhood as displaying extreme difficulty in communication--difficulty not due to sensory deficit or intellectual limitation but based on severe emotional disturbance. These children have historically been called psychotic or autistic (Kanner, 1943), although recent research with autistic children suggests that the language disability may be primary for many of these youngsters (Churchill, 1972; Rutter, et al., 1971; Cantwell and Baker, 1977).

These, then, are severely language disabled children: children who will clearly require special social and educational management, children for whom the biological bias for acquisition of language has been disrupted by relatively discernible causes. There remains another perhaps more enigmatic group of children who are not learning language efficiently. These children, labeled variously developmentally aphasic, dysphasic, language impaired, specific language disabled, or language delayed, show none of the extreme perceptual, intellectual or emotional deficits of the previous groups, yet they acquire language more slowly and with far less success than their peers. Such children have been recognized since at least 1866 (Vaisse, 1866). Attention to their problems has appeared sporadically in the neurologic literature throughout the first half of the century (Ley, 1929; Worster-Drought and Allen, 1929; Ewing, 1930; Launey and Soule, 1952; Gens, 1952). In 1937, educator Samuel Orton suggested that most of aphasic children's difficulties were based on problems with temporal ordering.

Widespread interest in these youngsters in America, however, seems to have developed from post-war involvement with adult brain-damaged patients (Goldstein, 1942). A group of psychologists/speech pathologists who had gained experience with aphasic disorders of language through work carried out predominantly in veterans' hospitals, began to delineate similarities between the adult aphasics' language behaviors and certain types of developmental language disorders (Goldstein, 1942; Eisenson, 1960, 1966; Myklebust, 1952, 1954; Jakobsen, 1968). During this period characteristic descriptions of such children stressed the presumed causal factor of "a deficit in the central nervous system" (McGinnis, Kleffner, and Goldstein, 1956). In fact, one autopsy study did reveal "severe retrograde degeneration in the medial geniculate nuclei" (Landau, Goldstein, and Kleffner, 1960). It was also during this time that some of the first systematic attempts to train aphasic children were reported (McGinnis, 1956, 1963; Kleffner, 1959; Berko and Palmer, 1952), while research studies continued to explore the medical/neurological implications of the disorder (Hannigan, 1956; Cohen, 1956; Arnold, 1961; Goldstein, Landau, Kleffner, 1958).

In the fall of 1960, a conference was held at Stanford University at which some thirty professionals from the fields of medicine, education and related disciplines met to consider children with specific developmental disorders of language. The Proceedings of the Institute for Childhood Aphasia (West, 1962) reported the following definition of "childhood aphasia":

> . . . impairment of language function (expressive and receptive) resulting from maldevelopment or injury to the central nervous system, prenatally, paranatally, or post natally (not later. . . than the normal time for the development of speech. . .). The language deficiency may or may not be associated with other cerebral or neurological pathology or dysfunction.
>
> Excluded are language problems associated primarily with:
>
> (1) mental deficiency
> (2) hearing impairment
> (3) central nervous system damage effecting the peripheral speech mechanism
> (4) emotional disturbance
> (5) delayed maturation in language development resulting from social and emotional factors or physical factors not primarily due to central nervous system involvement (p. 1).

This conference served to highlight and consolidate a growing interest in the identification and treatment of children with such nonspecific disorders of language. And while little consensus was reached among conference participants, many of the questions raised during those days have influenced clinical research and educational practice up to the present time. The general definition of childhood aphasia as a language deficit where the etiology is most often presumed to be pathology of the central nervous system and where a disorder of language behavior is judged to be the primary problem (not a result of low cognitive abilities, deafness, or emotional problems) is still generally recognized, although the medically-derived term "aphasia" is rarely used these days. More often now such children are referred to by one of the various other labels listed previously, reflecting de-emphasis on the medical aspects and an increased concern for the educational and social implications of the condition. In this study, the relatively neutral term "language disordered" will be used to refer to these children.

In the two decades since the Institute at Stanford was held, increasing attention has been paid to language disordered children from both a research and an educational perspective. A tremendous outpouring of information about the acquisition of language in normal children, the result of psycholinguistic research, has provided new tools and new insights with which to approach this clinical population. At the same time, new public awareness of the rights of minorities, including the handicapped, has grown tremendously. Twenty years ago most language impaired children were probably required to make their educational way entirely within the regular school program, or, failing that, were assigned to classes for slow learners. Today such children are guaranteed a "free and appropriate public education" in "the least restrictive educational environment" (Public Law 94-142, Appendix I).

As we approach the twentieth anniversary of that conference at Stanford, it seems particularly appropriate to pause and reflect on what is currently understood about children with nonspecific language disorders. In twenty years what have we learned about the nature of these children's disability? What have we learned about the progress they make educationally? These two issues will be reviewed briefly in the following sections as background for the current study.

The Nature of Developmental Language Disorders

Three recent literature reviews represent the first serious attempts at summarizing research with language disordered children. Bloom and Lahey in their extremely thorough text, Language Development and Language Disorders (1978), report virtually every major language-related study carried out to that time with the entire spectrum of language disabled children, including those labeled deaf, mentally retarded and autistic. These authors consider "childhood aphasia" in terms of their central organizing construct, i.e., that all language processes are interactions of "content-form-use." They suggest that dysphasic impairments represent predominantly a disruption in the form of language (the linguistic code) in contrast to its content (underlying concepts or ideas) or use (interpersonal communication ability) (p. 511).

Two review chapters currently in press focus more narrowly on the language disordered child with normal intelligence and hearing (Weiner, in press; Johnston, in press) and both suggest a somewhat broader arena in which effects of the disorder are apparent. Weiner concludes his review by suggesting in a somewhat tongue-in-cheek fashion that only three facts about nonspecific language disorders are widely accepted: 1) they *do* exist, 2) their manifestations vary from child to child, and 3) there is a strong tendency for such disorders to occur in boys.[1] However, in arriving at these less than controversial conclusions, he carefully reviews the major issues around which existing research has evolved: classification systems, the delay-versus-difference controversy, and what might be termed the "three C's of language disorders"--causes, correlates and consequences.

Weiner points out the lack of empirical evidence to support classification schemes within the language disordered category. Clinicians and researchers alike seem to vary on interpretations of the "unity" of the concept, some excluding speech-articulation deficits unless accompanied by problems in syntax and morphology or semantics (Lee, 1966) and others not making this distinction, except perhaps as an index of severity (T.S.S. Ingram, 1972). Another classification system which has proved clinically persistent, if not operationally clear-cut, is the distinction between receptive and expressive language difficulties. Weiner reports literature that suggests receptive disorders are generally considered to be more disruptive than expressive ones and are usually characterized by phonological, syntactic and, in the most severe cases, semantic deficits (McGrady, 1968;

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[1] This sex bias is seen throughout populations of learning handicapped children (see Farham-Diggory, 1978, p. 36 for discussion).

Aram and Nation, 1975; Wiig, et al., 1977). Expressive disorders are most frequently described as verbal apraxias or dysarthria, although there is some disagreement as to whether these belong in the language disorders category at all (Eisenson, 1968, 1972).

Evidence regarding the delayed versus deviant nature of language disorders appears, for the time being at least, to be substantially weighted in favor of the delayed-yet-normal position. The original protagonist on this issue was Menyuk (1964) who, using a transformational analysis of spontaneous conversation, reported that the speech of language disordered children was based on a different (and deviant) set of underlying rules when compared to age-matched normals. Morehead and Ingram (1973) challenged this directly by matching their subjects on the basis of linguistic criteria (mean length of utterance) and showing that at each linguistic level the same grammatical patterns were being used by children in the two groups at approximately the same frequencies of occurrence. Subsequent studies corroborated this observation; the language disordered child's use of major syntactic categories resembles that of a younger normal child (Johnston and Schery, 1976). More recently, similar developmental correspondences have been demonstrated in semantic and pragmatic domains. (See Johnston for a review of this literature. She claims that to date no major discontinuities in the sequence of learning language have been demonstrated even when this learning is accomplished markedly out of phase.)

Weiner's discussion of the causes, correlates and consequences of language disorders illustrates how little is still actually known about most aspects of the lives of these children. Evidence supporting a physical basis for the disorder (usually reported as neurological indicators and most recently including dichotic listening data) has been observed in, at most, a bare majority of cases (Forrest, Eisenson and Stark, 1966; Goldstein, Landau, Kleffner, 1960; Rie and Rie, et al., 1978; Rosenblum and Dorman, 1978; Pettit, 1979). There continue to be many language deficient children, indistinguishable from the general group on any aspect of their behavior, who give absolutely no evidence of neurological dysfunction. Of course, as most authors point out, the techniques for diagnosing what is going on in a child's brain and nervous system have been less than ideally sensitive. Recent technical advances may make future efforts at detection of subtle neurological differences more likely (Otto, et al., 1973; Satterfield, 1973). The effect of genetic influences in these disorders has been suggested (Arnold, 1961; Luchsinger and Arnold, 1965; Lenneberg, 1967), but no data are thus far available to support this assertion. Byrne, et al. (1974) make the interesting suggestion that children with more severe disorders of language are those most likely to show histories compatible with brain damage (breathing difficulties, Rh-incompatibility, seizures, etc.)

while those with a moderate degree of impairment may be of a more genetic, family-related etiology.

Studies of possible environmental causes of language disorders have been few indeed. Goldfarb (1945) found that severe social deprivation, such as that experienced by children in some poorly staffed orphanages after World War II, was related to language delay. The recent case of Genie (Curtiss, 1977), discovered after almost eleven years of unbelievably extreme social and physical deprivation, illustrated both the effects of such deprivation on language development, and the capability of the human brain to compensate for such barriers to language acquisition once they are removed, even past the so-called "critical years" (ages 2-12). Fortunately, most language delayed children do not live in such pathological environments. However, studies by Weiner (1969), Wulbert, et al. (1975) and Elardo, et al. (1977) present preliminary evidence suggesting that the maternal home environments of language disordered children may be less supportive than environments of normal speaking children. Owen, et al. (1971) cite similar findings for children with reading and academic disorders. Of course, a possible interaction effect cannot be ignored; the mothers of these children may be responding to rejection and negative feelings initiated by the child. At any rate, no clear cut evidence of systematic differences in the home environments of language disordered children and normal peers has been demonstrated to date.

Weiner's discussion of causal influence centers predominantly on perceptual factors including detection, discrimination and ordering of sequential events. This perceptual area has prompted more studies than any other with this population during the past two decades. Particular interest has focused on investigation of these children's suspected deficits in sequential ordering and memory (see Weiner, in press, for a review of most of them). Currently it seems that stimulus duration and the related rate at which language disordered children can process temporal signals may be a significant variable: language disordered children appear to have difficulty discriminating and identifying brief auditory events, both linguistic and nonlinguistic in nature (Tallal and Piercy, 1973, 1974, 1975).[2]

In discussing correlates and consequences of developmental language disorders, Weiner refers particularly to research on disorders of reading (dyslexia) and rightfully points out the complementary nature of these two lines of inquiry which have developed essentially separately. Although clinicians have long recognized a link between disorders of language and difficulties in learning to read, since Orton's time the search has emphasized perceptual bases for reading disorders (see Farnham-Diggory, 1978, for an excellent review of the history of dyslexic learning disabilities,

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[2] The modality specificity of this disorder is in question. Tallal has recently reported replication of her studies which support similar constraints for brief visual stimuli (Tallal, 1979).

Chapters 1-4). Recently, with a renewed awareness of the linguistic nature of the reading process (Goodman, 1967; Kavanaugh and Mattingly, 1972; Smith, 1973; Harvard Educational Review, 1977), investigators have begun to explore the overlap between the areas. Some studies have sought to determine the knowledge that poor readers have of linguistic structure (Vogel, 1975) and their ability to recall words (Wiig and Semel, 1976). Once again, the resulting picture is not clear. Some children with reading disorders appear to have oral language deficits; others comprehend and communicate verbally with marked facility. Owen, et al. found that 47 percent of their learning disabled poor readers had been referred to speech therapy for speech articulation difficulties or disorders of receptive and expressive language (1971). Systematic studies of the reading ability of language disordered subjects are lacking, but clinical case histories (Weiner, 1974; Ajuriaguerra, 1965) suggest that reading difficulties, along with other academic deficits, are certainly common, if not universal, as these children grow older.

Johnston, in the most recent literature review, organizes her discussion around five key research topics: perceptual functioning, language acquisition patterns, social-emotional health, intellectual development, and central nervous system integrity (Johnston, in press). She covers much of the same material as Weiner but does a particularly provocative job of reviewing evidence which suggests a unitary underlying deficit for processing temporal events in language impaired children (Efferent Perceptual Deficit). Her synthesis of the research on language acquisition patterns of these children is elegant, a thoroughly readable discussion reflecting her command of the complex normal child language acquisition literature. In her discussion of intellectual development, she voices some important cautions concerning the interpretation of performance I.Q. tests, as measures of cognitive ability in language disordered children. She also suggests the possibility that some language deficient children may represent extremes in individual variation. We shall return to consider several of these points and related specific questions raised by both Johnston and Weiner in the final results section of this study.

A related issue which Weiner raises is of particular interest because of the nature of the current study. That is the question of the duration of the language disorder. How long are the effects of a developmental language disorder apparent? What is the prediction for the future development of language skills in these children? Given appropriate intervention, will they ever be "normal"? Which children progress the most? Such important questions can best be answered through a longitudinal research paradigm. Unfortunately, very few such studies exist. The most comprehensive body of research on the assessment and training of children with language deficiencies has been carried out by de Ajuriaguerra, et al. in France (1958, 1965, 1976), who followed seventeen children diagnosed as dysphasic in childhood over a period of 2-4 years. The investigators reported that increased failures were observed in nonlinguistic areas such as emotional health and school success as these children approached adolescence, and this despite progress in language therapy. Petrie (1975), looking at only the linguistic domain, found that in a group of children with severe receptive difficulties, children with the least severe initial language deficit made the most progress. The longest term follow up study was conducted by Hall and Tomblin (1978) on eighteen language disordered and eighteen articulation impaired clients from the university of Iowa Speech and Hearing Clinic some thirteen to twenty years after initial contact. Half of the language impaired subjects continued to exhibit communication problems as adults compared to only one of the articulation impaired group. Similarly, studies by Weiner (1972), Wolpaw, Nation and Aram (1977) and O'Grady, et al. (1974) suggest somewhat discouraging long-term prospects for language disordered children.

It seems then that longitudinal studies have supplied preliminary evidence of the pervasive and long-term nature of a language disordered child's handicap. De Ajuriaguerra's studies, in particular, look at ways in which the total development of these children changes over time. Longitudinal studies are notoriously difficult and expensive;

such investigations reported to date, while promising, generally have restricted the range of variables examined (Rosenthal, 1971, 1972; [illegible], 1975; Wolpaw, et al., 1977) or have included relatively few subjects (de Ajuriaguerra, et al., 1963). Nevertheless, it has been a beginning.

In summary, then, today's picture of a developmentally language disordered child continues to be complex and multidimensional. Research efforts have been concentrated in certain domains--neurological correlates, perceptual bases of the disorder, and linguistic descriptions of the children's speech. Yet, even here, few answers emerge. There is some, but not overwhelming, evidence of a neurological basis for the disorder. There is growing evidence to suggest that these children may have significant difficulty in processing brief perceptual stimuli. There are studies which document that the syntax and semantic relations expressed by language disordered children are similar to that used by younger normal children rather than being different in any consistent way. There remains a distinct need to fill in general descriptive information about these children--their early language histories, medical histories and socioeconomic backgrounds. For the most part, family histories of language and learning problems are unavailable. Little is known about the social-emotional climates of these children's homes. Descriptions of educational and linguistic progress of language disordered children have been restricted to relatively few case studies.

Educational Programming for Children with Language Disorders

Educational programming specifically for children with language disorders is a relatively recent development. California, which began such classes in 1960 primarily as a response to parent involvement, has been the only state to use the label "childhood aphasia." Beginning about the same time, several other states have included children with language deficits in classes for, variously, perceptually disabled, language disordered, educationally/neurologically handicapped, brain injured, or specific learning disabled children (Cruickshank, 1967). Since 1978, federal law (Education for All Handicapped Children Act--U.S. Public Law 94-142), guarantees their education under special provision for children with Specific Learning Disabilities. The United States Congress has accepted the following definition of this group:

> Those children who have a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. Such disorders include such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. Such term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, or mental retardation, of emotional disturbance, or environmental, cultural, or economic disadvantage (Section 5 (b)).

This legislation has been characterized as civil rights legislation. There is little doubt that new political awareness of their children's educational rights will help parents of learning disabled children insist upon special educational consideration for these youngsters in areas where it has not previously existed. There is also almost a certainty that the category will initially be overinclusive: parents would rather believe that a child suffers from a defect like a "perceptual disorder" or even "developmental aphasia" which sounds like it might be cured, than accept the hopelessness generally associated with terms such as retardation, or even just plain slow. As an example, witness the extremely rapid growth of classes for aphasic children in California since the first class was formed in 1960. Figures are available only as far back as 1973 (Table 1). There is some evidence that prior to availability of such classes, some of these children were being educated in classes for educationally mentally retarded (EMR) students. Indirect evidence comes from the concurrent enrollment figures in EMR classes during this period. Table 1 shows that enrollment in these classes fell from 59,386 in 1969 to 18,2-7 in 1977,[3] a marked decline. A 1970 follow-up of 77 children seen at the Institute for Childhood Aphasia at Stanford University between the years

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[3] Much of this decline may be attributed to litigation on behalf of culturally different children which claimed that prevalent I.Q. tests unfairly penalized non-majority children. In 1977, some EMR children served in California "Master Plan for Special Education" Districts were excluded from enrollment reports since they were reported separately and as non-categorical totals. However, such Master Plan Districts applied to less than 5 percent of school districts in California.

1963 and 1965 indicated that 42.9 percent of the children were then enrolled in EMR classes versus 6.5 percent in classes for Aphasic-Brain Damaged (Rosenthal, et al., 1971). No record was made of whether all the school districts involved even operated classes for aphasic children in 1979; however, Rosenthal's figures suggest that language disordered children in the late 60's tended to be grouped educationally in classes for mildly retarded students.

Table 1: Enrollment Figures for California
Aphasic and EMR Programs, 1968-1978

	Aphasic	EMR
1968	unavailable	59,386
1970	unavailable	56,566
1971	unavailable	48,358
1972	unavailable	33,091
1973	2,592	29,609
1974	2,788	26,575
1975	5,157	23,693
1976	6,634	19,887
1977	8,249	18,277

Source: California State Department of Education

How many "true" language disordered children should we legitimately expect to plan for in special educational programming? Incidence figures for children with primary language deficits are difficult to find but seem to suggest somewhat under one-half of one percent of the school age population (Rutter, et al., 1970; Marge, 1971). The most extensive study was carried out in England (Stevenson and Richman, 1976) and involved a one in four sample of the entire population of three-year-old children in a London suburb. At least in that setting such "specific language delays" appeared in 5.7 out of 1,000 children. It takes only elementary mathematics to calculate that if one-half of one percent of school age children are involved (not to mention those children aged 3-5 for whom service is mandated by 1981 by PL 94-142, we are talking about over 200,000 children nationwide (total U.S. school enrollment 1977 (K-12)=43,153,000, Information Please Almanac, 1979).

Providing special educational services is expensive, particularly in areas of low population density. There is generally a lower than normal child/teacher ratio in addition to added costs for special materials and support services such as diagnostic testing, counseling, etc. Cost figures for the small class, intense language program described in this study averaged $4,948.00 per child per year between 1972 and 1978 (source: State Department of Education). If special programs for all language disordered children are funded at even a portion of this level, the projected cost will be enormous. Without working through the exact figures, we can imagine a scenario which would result in a very significant national commitment of tax dollars. The realities of inflation and our "taxpayer revolt" make this an unlikely outcome, at least on a longterm basis. How, then, should these newly mandated programs for language disordered children be developed so that a balance is struck between the special educational needs of the children and the most effective and cost-efficient strategies for meeting these needs?

One logical approach to this problem is to scrutinize existent program models for language disordered children. Information about the children's progress in such programs, their length of stay and their ultimate disposition can be helpful in deciding which kinds of children benefit most from such a program. Perhaps it can also suggest refinements for future program implementation. The current study undertakes exactly such a task.

This study has taken advantage of the existence of a large archival data set collected on language disordered children and maintained over a period of eight years by the Los Angeles County Superintendent of Schools Office, Division of Special Education. The thoroughness with which standard information was collected at program intake and the relative consistency with which language measures were repeated over the years, resulted in an archive of unusually complete school records. The unique advantage that the archive offered, however, was the opportunity to consider large numbers of language disordered children within a single study: ultimately useable records for 718 subjects were obtained. The next chapter describes the specific program context and methodological approach employed in the study. The overall goal of the effort was to assemble information from the archives on the widest range of background variables possible for the largest group of language disordered children possible. This descriptive information, when considered in relation to language performance at the time of program admission, would hopefully help to fill in some of the "missing information" on developmentally language disordered children. Since repeated language measures were available for the children, analysis of change within the program in relation to varying characteristics at intake was possible, i.e., determination of which children made the most progress within the program.

The nature of the data dictated a correlational analysis, therefore many potentially interesting causal hypotheses could not be tested. The nature of the program, compensatory service/special education, precluded experimental controls. Nevertheless, the study stands for what it is, an attempt to gain perspective on language disordered children as a group; to provide an overview of their physical, social-emotional, cognitive, and socio-economic backgrounds and to relate these characteristics both to their levels of language functioning and to progress in a special remedial program.

CHAPTER II

EDUCATIONAL CONTEXT FOR THE STUDY

The Students: Criteria and Procedures for Program Admission

Between 1970 and 1978, the Los Angeles County Superintendent of Schools Office, Division of Special Education, provided diagnostic and educational services for children with severe oral language disorders/aphasia on a contract basis to 76 individual school districts around the perimeter of the 4,080 square miles comprising this huge metropolitan basin.[1] Originally, a central diagnostic team consisting of a pediatrician with background in pediatric neurology, a licensed school psychologist and a speech pathologist with a certificate of clinical competence in speech from the American Speech and Hearing Association, accepted referrals from school districts and conducted a one to four day evaluation of each child referred. Criteria for program admission were delineated in California Education Code Title V regulations, Section 3600(g) (see Appendix II), which, for the State of California, legally defined a severe language disordered/aphasic child as follows:

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[1] Language disordered children in the central Los Angeles urban area were served by a separate program operated by Los Angeles Unified School District. This very large central urban district (enrollment 665,754 in 1978) included all children within Los Angeles city limits, including the San Fernando Valley (see map, Appendix III).

> (g) The Aphasic. A minor is aphasic when all of the following statements apply to him:
> (1) He has a severe speech and language disability.
> (2) The dysfunction or impairment is evidenced by a written diagnosis or determination (as appropriate) as aphasia or probable aphasia by each of the following:
> (A) A licensed physician and surgeon who has training and experience in working with children who have neurological defects;
> (B) A credentialed or certified psychologist;
> (C) A teacher (or specialist) credentialed in the area of the speech and hearing handicapped, or a member of the staff of a speech and hearing clinic or center who holds certification by the American Speech and Hearing Association.
> (3) The disability is diagnosed or determined (as appropriate) by each of the persons described in (2) to be other than a speech and language disability associated with deafness, mental retardation, or autism, and to be of an expressive, receptive, or integrative character, or any combination of such characters.
> (4) The disability is of such severity as to require enrollment in a special day class, individual instruction, or instruction under Education Code Sections 6871-6873.

In 1974, these regulations were amended so that a physician was no longer a mandatory member of the admissions/eligibility team, although a corroborating medical statement describing possible neurological involvement was required. From that time a teacher of aphasic children attended eligibility committee meetings and had to concur on appropriateness of placement decisions.

Referrals to the Los Angeles County program grew so rapidly that by early 1971 two diagnostic teams were needed. As growth continued, personnel were added until, by 1976, eight teams of psychologists/speech pathologists were operating in separate geographic areas of the county (see map, Appendix III). Throughout this time the members of these teams met together as a group with the central office program consultant and program administrators at regular intervals (weekly to monthly) to discuss common concerns, including assessment procedures, referral trends and programming needs. There was considerable movement among these geographic assignments even as late as 1975; virtually all staff had opportunity to work in a variety of program settings and to coordinate decisions with varying professionals. This probably resulted in a relatively homogeneous interpretation of Title V criteria throughout the program. Particularly puzzling children were often seen by more than one psychologist or program specialist (the title given the speech pathologists who conducted the speech and language assessments).

Before a child was seen for evaluation, a screening procedure was followed. The three critical items necessary before assessment could take place were 1) a standard referral letter from the district of residence which included information on prior school history and basic family data as well as the parents' signed permission to proceed with the evaluation; 2) a parent questionnaire, the format of which remained stable after several modifications during the initial two years; and 3) a physician's report as well as copies of any pertinent medical records. Appendix IV contains copies of these forms. The referral letter and parent questionnaire were almost universally supplied on the standard forms. Physicians' reports varied greatly both in format and in thoroughness.

A recommended battery of language measures was developed by program specialists based on general practices within the field, available standardized instruments and the program specialists' clinical experience. The recommended instruments and procedures varied somewhat based on the child's age. Few standardized measures were available for the child over ten years of age. Over time, several new tests were introduced while others were dropped. The most consistently administered language tests and procedures during the time the archive was assembled, along with a brief description of each, are listed in Table 2. These were the measures selected for use as dependent variable(s) in the current study.

Psychologists in the language disorders program tended to have preferences for one or another nonverbal intelligence measure. The two most commonly administered tests were the Leiter International Performance Scale, Arthur Adaptation (1952), essentially a block design task, and the Performance Scale of the Wechsler Intelligence Scale for Children (W.I.S.C., 1949),[2] which consisted of five subtests including Picture Arrangement, Picture Completion,

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[2] The W.I.S.C. came out in revised form in 1974 and is referred to as the W.I.S.C.-R. Both forms are included in I.Q. data for this study.

Table 2: Selected Measures of Language Performance Included in Archive[1]

Oral Motor Skills: Clinical rating of speech mechanism functioning for voluntary movements.

Articulation Skills: Clinical description of speech sound production ability based on formal and informal articulation testing.

Peabody Picture Vocabulary Test (P.P.V.T.): Measures understanding of verbally presented lexicon by pointing to one of four picture plates.

Illinois Test of Psycholinguistic Abilities (I.T.P.A.): Selected subtests:

- Auditory Reception: Measures comprehension of verbally presented material by answering yes/no questions.
- Auditory Association: Measures ability to relate concepts presented orally through a verbal analogies format.
- Grammatic Closure: Measures production of specific inflections and syntax in a sentence completion format.
- Visual Memory: Measures ability to reproduce from memory a sequence of nonmeaningful figures on plastic chips.
- Auditory Memory: Measures ability to reproduce from memory a sequence of digits.

Northwestern Syntax Screening Test (N.S.S.T.): Receptive portion measures understanding of verbally presented morphological and syntactic structures by pointing to pictures: Expressive portion assesses production of similar grammatical forms through a delayed imitation response with picture cues.

Mean Utterance Length (MLU): Calculates average number of words per utterance from a recorded spontaneous language sample of 50-100 utterances.

Elicited Imitation: Measures ability to repeat correctly sentences modelling various transformational structures.

Coding (or Mazes, Object Assembly, and Block Design. Despite their titles, neither of these scales is completely nonverbal. The W.I.S.C. requires response to verbal directions and, particularly at higher levels, both tests tap abstract concepts the learning of which is heavily influenced by language input. However, in contrast to such verbal intelligence measures as the Stanford-Binet or the Verbal Scale of the W.I.S.C., neither of the performance scales requires a complex verbal response from the child. Both measures, but especially the Leiter, stress visual-perceptual components of cognitive functioning such as visual pattern recognition and discrimination of fine visual detail.

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[1] See Test Listing in Bibliography for exact references on these measures.

After diagnostic testing was completed for a child, an admissions committee meeting was held which the parent and representative(s) from the home school district attended. If the child met the criteria for placement in a class for children with severe oral language disorders/aphasia, he/she was assigned to the first available opening in an appropriate age level class as near his/her home as possible.

California state law requires that each aphasic child's eligibility be reevaluated on an annual basis. For the first three years of Los Angeles County's program, this was interpreted to mean complete readministration of all formal assessment procedures. When increasing numbers of children made this unfeasible, an alternate interpretation was adopted: complete psychological and language reassessment was accomplished every three years unless requested prior to that date by teachers, administrators, or parents. Each year classroom teachers administered a language sample, did achievement testing, and requested such additional formal language testing as they thought would be helpful for program planning. Results of any formal testing, including language sample summaries and academic scores, were recorded on a standard form (see Appendix IV) which was kept at the appropriate diagnostic team office. A duplicate copy was forwarded to the confidential psychological records section at the central office.

The Educational Program

The Los Angeles County Superintendent of Schools Office in most cases operated classes for the children identified by the diagnostic procedures outlined previously. Class size was limited to six for children ages 3-9; eight children were included in classes for 10-18 year olds. Classes were held for full instructional days, although some students spent as much as three hours integrated into regular classes. Teachers in the program were (minimally) required to have a California State Clinical Services Credential for Speech and Hearing. In addition, the majority of teachers had master's degrees and were certified by the American Speech and Hearing Association.[3] Instructional aides were provided for each classroom.

Classes were held in rented classroom space widely scattered throughout the county. It was a policy to procure two to four adjacent classrooms on a regular school campus whenever possible. This was to facilitate integration with normal peer models. When it was necessary to operate a segregated all-special-education site, the classes consisted of preschool aged children, leaving the space available at "integratable" schools for schoolage children. For administrative and some programming purposes, the program was divided into five age levels as listed in Table 3.

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[3] In 1975 the program was accredited by ASHA, one of the first public school programs to be so designated. Accreditation includes verification of standards for supervision, data collection and record keeping as well as qualitative provision of comprehensive language and speech services.

Table 3 also shows the proportion of elementary and secondary children enrolled during the period of the study.

A note is perhaps in order about the number of preschool children in the program, since 233 children in the study were of preschool age at pretest; 79 were still preschoolers at the time of posttesting. Title V regulations made provision of services for preschool children "permissive" (i.e., allowed but not mandatory). At the inception of Los Angeles County's program, a commitment was made to seek out young children whenever possible in the hopes that early school failures might be averted. A concerted effort was made to locate preschoolers, using community resources such as Head Start programs and pediatricians. In some areas speech therapists working in the local schools sent letters home with kindergarten through third graders advertising free screening services for children three and above. On the basis of this local district screening effort, many young children were referred to the diagnostic teams.

The number of children identified grew rapidly during the early years of the program, often taxing the ability

Table 3:

Program Enrollment During Study

	Academic Year							
	70/71	71/72	72/73	73/74	74/75	75/76	76/77	77/78
Elementary (Age by 9/1)	62	254	410	561	759	975	1138	1421
Preschool: 3.0 to 5.8 Primary: 5.9 to 8.11 Middle Grade: 9.0 to 11.8								
Secondary (Age by 9/1)	--	--	--	17	21	34	43	66
Junior High: 11.9 to 14.8 Senior High: 14.9 +								
Total Enrollment	62	254	410	578	780	1009	1181	1487

of administrators and the business and personnel offices to locate qualified teachers and appropriate classrooms and to supply adequate support and materials. One of the chief disadvantages of renting classroom space rather than owning it (the latter option is not available to county offices by California law) is that the program can become somewhat of a "gypsy." Often, especially during the early years, classes had to be relocated again and again as local district needs for space shifted. Such instability made it difficult to cultivate helpful local-campus contacts from one year to the next, and disrupted peer and social relationships for the students affected.

Unfortunately, no consistent records were kept of the nature of individual classroom programs. The general program philosophy stressed primary attention to development of oral language in every aspect of the child's program. With preschool and early primary aged children especially, little structured academic instruction was provided prior to systematic attempts to teach the underlying language concepts. During 1972-1975, program staff, working with personnel from other areas of special education, developed a bank of sequenced instructional objectives (C.A.R.E., 1974-76) which served for several years as a suggested curriculum framework. The language skills section contained objectives in the content domains of initial communication processes (perceptual/motor and social precursors to language), articulation, syntax and morphology, semantics, and written language (reading, spelling).

In general, an experiential approach to language development was stressed: a wide variety of manipulative materials was available and provisions were made for several field trips each year. Degree of formality/structure varied a great deal from classroom to classroom. So did the amount of time spent in directed pattern practice, drills, sequencing and memory exercises, role-playing, communication games, etc. Because of small numbers in any given geographic area, teachers often had the same students more than one year, although it was an informal policy to move students at least every third year in order to provide a variety of language models. Teachers were encouraged to try out and adapt published materials: a 1975 teacher survey of reading programs reviewed thirty-two programs and purchased eight for general availability. None was ever adopted across the entire program, although units of teaching staff working together often chose to utilize only one or two series for program continuity. Generally, the first approach to reading might best be described as language-experience. Decoding skills were introduced somewhat later and were presented simultaneously with strategies emphasizing comprehension.

In summary, a varied and eclectic approach to language remediation was provided throughout the program: teachers were encouraged to utilize techniques and strategies which fit their personal philosophies. An experiential approach to both language and reading was fundamental.

CHAPTER III

METHODOLOGY AND ANALYSIS STRATEGY

Data Collection Procedures

This study was funded through a grant from the Bureau of Education for the Handicapped, Division of Innovation and Development, Student Research. The student project director, a Ph.D. candidate, was employed as a staff member of the Los Angeles County Superintendent of Schools Office, Division of Special Education, and had worked with the language disorders program since its inception. There was general concern within the office that, due to space storage problems, the detailed records of the program were being destroyed without the necessary scrutiny for deciding what information had been most useful in identifying and planning for language disordered children. The proposal on which this research was based was approved not only by Claremont Graduate School, but also by the Los Angeles County Board of Education. The Division of Special Education cooperated fully in making records available, following approved procedures to maintain confidentiality. Between October 1, 1978, and January 1, 1979, the student project director, a graduate student research assistant, and three graduate student coders worked at the central office in Downey, California, approximately two days a week reviewing records for all children who had been referred to the language disorders program. Records were maintained separately for children currently enrolled and those who had either been seen for diagnostic evaluation and not accepted or who had been enrolled and had subsequently left the program. Virtually all records were reviewed. Only those children who had relatively complete scores on the assessment battery both at pretest and on posttesting between two and three years later were coded.[1] Approximately 50 percent of children who had been enrolled and had left the program qualified. The remaining children in this category had left the program prior to a second year reevaluation, or had moved or otherwise left the program before complete annual testing could be accomplished. Approximately 30 percent of the students who were currently enrolled as of January 1, 1979, met criteria for inclusion in the study. The remaining enrolled students had either not been in the program for a sufficient period of time, or their reevaluation testing dates had not coincided with guidelines for the study (beginning 1974 complete test batteries were not given every year).

The student investigator and research assistant screened all files and made judgments of ratings on articulation and oral motor skills, using criteria developed from preliminary analysis of random files (see Appendix V). Interrater reliability was checked prior to the actual coding procedure to ensure that similar judgments were being made (r=.94). Additional reliability checks were made of coders' work by double-coding portions of random files. This was accomplished most systematically for students still enrolled in the program. Between January 15, 1979 and April 1, 1979, coding for background information was carried out for these students at their local school offices (see map, Appendix III) since the Parent Questionnaires were not sent to the central file until a child had left the program. In addition to coding the background information from these questionnaires, test scores and dates were verified against the local school records, providing a verification of coding accuracy.

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[1] The time interval was selected as sufficient to show progress on formal language measures while retaining a large percentage of pupils for whom longitudinal records existed.

Defining the Dependent Variable

A wide range of language and language-related pre/posttest measures was available in the archive data. Table 4 indicates the measures that were originally considered

Table 4:

Repeated Measures Considered For Use As Dependent Variables

Receptive

Peabody Picture Vocabulary Test
Northwestern Syntax Screening Test/Receptive
I.T.P.A.[2] Auditory Reception
*D.T.L.A.[3] Oral Directions

Expressive

Northwestern Syntax Screening Test/Expressive
I.T.P.A. Verbal Expression
*I.T.P.A. Manual Expression
I.T.P.A. Grammatic Closure
Mean Utterance Length from Spontaneous Language Sample

Combined

I.T.P.A. Auditory Assocaition
*D.T.L.A. Orientation
*D.T.L.A. Verbal Opposites
*D.T.L.A. Related Syllables
Elicited Imitation Sentences

Memory

I.T.P.A. Auditory Memory
I.T.P.A. Visual Memory
*D.T.L.A. Unrelated Syllables

Production Ability

Oral Motor Skills Ratings
Articulation Ratings

Academic

Reading
*Math
*Spelling

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[2] Illinois Test of Psycholinguistic Ability

[3] Detroit Test of Learning Aptitude

*Omitted in final analyses

for inclusion as dependent variables, organized by what had been anticipated a priori as predominant language processes. Measures with asterisks were ultimately not used.

An intercorrelation matrix on these various language measures (reproduced in Appendix VI)showed extremely high positive intercorrelations among virtually all tests (in the .40 to .70 range). This suggested that the various tests and subtests were not measuring the hypothesized language processes in any distinct manner. So, after eliminating subtests of the Detroit Test of Learning Aptitude because of the small number of subjects (this test had been administered predominantly to students aged ten or above who turned out to comprise less than 25 percent of subjects), a principal components factor analysis was run on the remaining pretest scores looking at the first principal factor only (see Table 5). This was accomplished not to delineate a factorial structure among the various language tests, but rather to determine the amount of variance accounted for by the apparently overriding general language factor suggested by the high positive intercorrelations. This single component by itself accounted for 57 percent of the total variance. Mathematics and spelling scores, while they had positive loadings on the factor, were similar to each other and loaded much less than other measures; therefore, they were omitted. Reading scores contributed more than math or spelling, yet loaded less than the remaining language measures. The reading score was retained because it added theoretically to the concept of a general language ability since it, uniquely among the tests represented, measured the written form of language usage. Similarly, the variables Articulation and Oral Motor had somewhat lower loadings than the rest of the measures, but they did load positively and substantially broadened and enriched the concept of a general language ability. The final dependent language variable that was excluded was the I.T.P.A. Manual Expression. This was omitted because of the large number of missing values at posttest. It was almost universally administered as part of evaluation for program admission, yet was much less likely to be included in subsequent reevaluations.

The remaining fourteen separate language scores (see Table 4) were combined into a composite dependent variable, one representing an overall or general language ability. This was done to achieve simplicity and to increase reliability by combining many different highly overlapping measures of language functioning into a single, robust measure. The latter consideration is particularly important since later analyses (in regression format) use the pretest language composite essentially as a covariate, a procedure that is particularly vulnerable to attenuation from unreliable measures.

The composite language variable was constructed by adding the separate standardized scores for the fourteen component variables. These scores had to be standardized separately because the diversity of scaling in the original measures meant that raw scores had widely varying ranges and, if added together directly, would overweight some scales relative to others. Unit weights were chosen to combine the various standardized scores into the overall composite. These were utilized rather than factor weights becasue all the individual components made substantial, positive contributions and because unit weights make analyses more stable and robust for any subsequent replication study (Wainer, 1976). Thus the standardized scores for all of the fourteen language measures were summed to yield a standardized composite language measure. This was done separately for the pretest language measures and for the comparable posttest measures.

In cases where a subject was missing three or fewer of the fourteen scores needed for the composite language measure, the standardized score earned by study children of the subjects' chronological age (calculated to the year) was substituted for the corresponding missing value. The same procedure was, of course, applied to both pretest and posttest scores.

An additional principal component factor analysis was then run on these final fourteen variables (see Table 5) for both pretest and posttest scores in order to assure a comparable factor structure. This would determine that any pre-post changes in performance were not primarily due to changes in the interrelationships among the variables within the composite. The only variable which showed a substantial change was Reading, which loaded much less on the posttest factor; it seems that reading test scores over a two-three year interval move somewhat differently from the rest of language tests and begin to measure a somewhat separate ability for this population. For this reason, additional regression procedures were carried out using reading as a single dependent variable.

Two other measures included in the composite language variable were also selected for separate regression analysis. The Peabody Picture Vocabulary Test, which had the greatest overall loading on the general language factor was chosen as 1) the purest measure of receptive language and 2) a cross-validation check on the overall composite language measure, which it greatly resembled. Finally, the articulation variable (ratings of clarity of production of speech) was utilized as a separate dependent variable representing the "productive performance capacity" of language-disordered children in the formulation of speech.

To review, regression procedures were carried out first on a "general language factor," a composite dependent variable constructed from fourteen separate language measures. Additional separate analyses were performed utilizing the three most divergent single measures that had been included within the composite variable (P.P.V.T., Articulation and Reading).

Table 5: Factor Loadings on First Principal Component of 14 Language Measures Included in Dependent Variable Composite

		Pretest	Posttest
	Peabody	.85	.80
I.T.P.A.	Aud. Recept.	.79	.78
	Aud. Assoc.	.89	.85
	Verb. Exp.	.84	.69
	Gram. Cloz.	.89	.86
	Aud. Mem.	.75	.65
	Vis. Mem.	.69	.53
	NSST - Rec.	.78	.80
	NSST - Exp.	.84	.85
	Oral. Mot.	.40	.42
	Artic.	.51	.53
	M. U. L.	.74	.72
	Elict. Imt.	.78	.77
	Reading	.68	.30

Eigenvalue:	8.04	6.90
% of Variance:	57.5	49.3

Defining the Independent Variables

Table 6 shows the variable sets which had been identified as potential predictors, and shows the *a priori* grouping of individual variables into conceptual clusters of variables that seemed to relate to similar themes. Demographic variables were categorized as *Background-Socio-Economic Status* (six variables including education and occupation of parents) or *Program Status* (seven variables including current status within the program, reason for discharge, if applicable, and subsequent educational placement). The *Physical* cluster (eighteen variables) was obtained from medical reports, health records, and portions of the parent questionnaire. *Language History* cluster (twelve variables) comprised parent reports of the subjects' early gestural, social, imitative and productive language abilities. The *Cognitive* variable was composed of a performance I.Q. measure (either the Leiter or the Performance Scale of the Wechsler).[4] The final predictor variable cluster was *Social-Emotional*. This consisted of sixteen separate variables derived from the parent questionnaire and focused on the student's social/peer relationships, personality characteristics and behavioral or discipline problems as perceived by the parent(s).

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[4] There is some reason to consider these two measures as non-equivalent. Of 66 children who received both tests at intake, the scores correlated only $r=.61$. Two tests were often administered when there were questions of validity of the initial procedure, so these children may represent a difficult-to-test and atypical subgroup.

Table 6: Predictor Variables Used In Analyses

Demographic Cluster	
Background/Socio-economic Status	Source: Parent Questionnaire, Referral Letter
Mother's education	
Father's education	
Father's occupation	
Type of residence	
Number of siblings	
Bilingual environment	
Program Status	Source: Program Records
Educational moves prior to enrollment	
Length of time in program (as of 1-1-79)	
Moves within program	
Current enrollment status	
Recommendation for educational placement at program discharge	
Reason for discharge	
Enrollment in itinerant program (follow-up at local/home school)	
Physical Cluster	Source: Parent Questionnaire, Medical Reports, Program Health Records
Maternal accident or illness during pregnancy	
Maternal age at birth of child	
Birthweight	
Complications of delivery (jaundice, breathing difficulties, etc.)	
Feeding difficulties as infant	
Sleeping difficulties as infant	
Age of walking	
Clumsiness/falling	
Frequency/type of illness (high fevers, ear infections, convulsions, etc.)	
Medication for behavioral/neurological difficulties	
Number/reason(s) for hospitalization	
Number of accidents	
Number of special diagnostic tests (EEG, skull series, spinal, etc.)	
Number of health providers in addition to family physician	
Diagnosis of neurological impairment by physician	
Hearing loss (unilateral/bilateral: mild/significant)	
Family history of language/learning problems	

Table 6, cont.

Language History Cluster	Source: Parent Questionnaire
Age of first word(s)	
Age of 2-word sentences	
Age when child first used words appropriately	
Abnormal crying in infancy	
Attention to caregiver	
Imitation-rating of current ability	
Gesture-amount currently used	
Articulation-ratings of current ability and improvement	
Hearing	
Comprehension/Listening-rating of current ability	
Usage of speech/language-rating current ability	
Cognitive Cluster	Source: Psychologist's Report
I. Q. Scores and subtest patterns	
Social-Emotional Cluster	Source: Parent Questionnaire
Parent's marital status	
Birthorder/position re. siblings	
Siblings with behavioral problems	
Favorite activities (social vs. isolated)	
Peer relationships	
Adult relationships	
Child receiving psychological therapy	
Positive statements about child (# written in) (Pleases most)	
Behavior problem(s) (# written in)	
Discipline problem(s) (# written in)	
Method of discipline	
Positive personality characteristics, e.g. "friendly" (item total checked) (+ Personality)	
Negative personality characteristics, e.g. "moody, fearful" (item total checked) (- Personality)	
Behavioral maladjustment indices, e.g. "lying, nail biting" (item total checked)	
Abuse potential	

Appendix VII includes intercorrelation matrices for each of these clusters of thematically related variables. In general the variables within each cluster presented a heterogeneous collection with correlations mostly in the r=.05 to .20 range. The Physical and Social Emotional clusters were extremely heterogeneous. Variables within the Language History and Program Status clusters were slightly more interrelated, but still on the order of .25 with many correlations much below this. The Socio-Economic cluster showed a somewhat higher degree of homogeneity for the education and occupational variables (r=.30-.65). although the remaining variables within the cluster had extremely low intercorrelations. In general, the six clusters appeared to represent collections of relatively unrelated variables despite their conceptual similarity.

The relationships among the various clusters of independent variables and the relationship of each to the Language cluster (dependent variable) is summarized in Table 7, which reports the canonical correlations between clusters. This table indicates a moderately high degree of overall shared variance between clusters (r's in the .45 range) with substantial overlap between some clusters, most particularly the Cognitive (I.Q.) measure with all the others. The Socio-Economic/Family Background cluster overlaps least across the other clusters, but is still in the r=.25-.50 range. The effects of age were not partialled out in this analysis and the large amount of overlap,

Table 7: Canonical Correlations Between Clusters Of Study Variables (uncorrected for age)

	Language (DV)	Lang. History	Cognitive	Physical	Social Emotional	Socio-Econ. Status	Program Status
Language (D.V.)		.67	.90	.49*	.42	.31	.80*
Lang. History			.64	.46	.40	.28	.58
Cognitive				.78	.81	.54	.76* [a]
Physical					.63*	.44	.45
Social Emotional						.53	.52
Socio-Economic Status							.25
Program Status							

*Significant at .05 level.

[a] Variables applying only to children no longer in the program had to be removed in order to run the analysis.

particularly for "test" variables such as I.Q. and the language measure, is highly influenced by the effects of age. Subsequent regression analyses correct for age and allow a somewhat clearer picture of the interrelationships among these various clusters.

Variability, Linearity and Missing Data

In initial stages of the analysis the proposed variables for inclusion within the independent variable clusters were examined for amount of missing data and to ensure sufficient variability so that subsequent correlations would not be attenuated beyond use. Some variables were discarded on this basis and several were recategorized to make their distributions more nearly normal. Similar checks were made of the variables when stratified by sex and by the five age groupings included within the program. These five age groups were reduced to three with the three oldest categories collapsed into one: a relatively small number of children nine years of age or older met criteria for inclusion in the study (see Table 3). Boys outnumbered girls by a ratio of about 2.6 to 1.

As part of this preliminary analysis, the underlying assumption of linearity required for correlational analysis was checked for key relations. Scatterplots were made of pretest scores versus posttest scores on the language measures in order to verify that the relationship was linear. Since the interval between pretest and posttest administrations varied from 18 to 40 months, it was also important to determine if a linear relationship existed between this interval and the change measures (i.e., to verify that rate of change proceeded fairly uniformly across this span of time). If so, the effects of unequal intervals could be statistically separated from the change measures. Scatterplots were made of time interval versus the standardized change score for all subjects in the study. To check for a possible interaction effect of age on this time interval/change relationship, separate scatterplots were run for the three age cohorts. These analyses confirmed that basic assumptions of linearity were sufficiently met to proceed with correlational analyses.

Table 8: Age Cohorts Included in Study Sample

		N	%
preschool:	(3-1 to 5-11)	233	32.5
primary:	(6-0 to 8-11	324	45.1
middle:	(9-0 to 16-0)	161	22.4
		718	100.0

Analysis of Change

The Change Score Issue: The analysis of change, most specifically the use of change scores, is an area of methodological difficulty which has prompted much recent comment and controversy (Cohen and Cohen, 1975; Cronbach and Furby, 1970; Harris, 1963; Lord, 1969; McNemar, 1958).

The calculation of gain scores by subtracting pretest scores from posttest scores (what might seem to be the most intuitive approach), turns out to be very misleading, partly because of the magnification of the inherent unreliability in any measure when posttests and pretests are differenced, but primarily due to statistical complications of a gain score's inherent dependence on pretest levels (see Cohen and Cohen, pp. 379-382 for a discussion of this issue). Hummel-Rossi and Weinberg, in Practical Guidelines in Applying Current Theories to the Measurement of Change (1975), suggest that for relating group change to various independent variables, a residualized gain score strategy employing partial correlation (multiple regression with the posttest as the criterion and the pretest as a covariate) is most appropriate. In the current study this procedure would require first removing the effects of the pretest score from the posttest score by regression procedures, then using the residuals to examine increments of change as a function of the various independent variables alone and in clusters.

While recognizing the possibility of alternate analysis strategies and the potential methodological problems of any single approach, this study has employed hierarchical regression techniques as recommended by Hummel-Rossi and Weinberg (as well as Cohen and Cohen). Such an analysis was first applied to the composite standardized language pretest scores in an attempt to predict entry level of language as a function of individual variables as well as the clusters of independent variables. The independent variable clusters were examined separately against the composite pretest score (after age at entry was partialled out) to show the relative ability of the individual variables within each cluster to account for language performance. In addition, the relative predictive value of the various clusters was examined by including them all simultaneously in a stepwise regression, the order specified *a priori*.

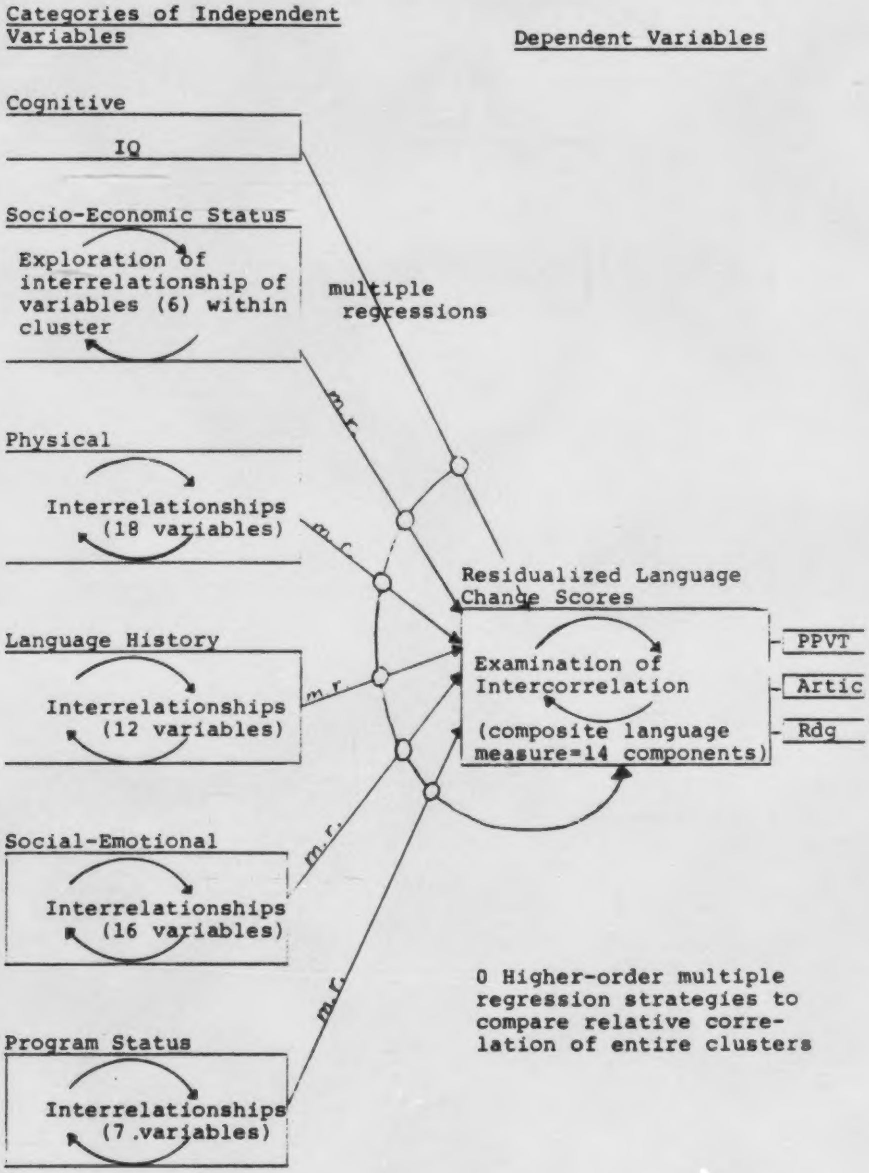
For the analyses of change in language performance, pretest scores were first partialled out of posttest scores. The result was, in essence, a residualized gain score--indicative of the amount of change in language performance that had occurred between pretest and posttest.

Next the time interval between pretest and postest was partialled out in order to equalize the residual gain increments across the timespan. Since the linearity of this time/gain relationship had been ascertained earlier, there was evidence to justify this procedure for adjusting pre/post interval differences.

Then the effect of age at pretest was removed, since the study was not primarily interested in varying language performances resulting from differences in age. The remaining residuals, e.g., that component of gain that was independent of time interval between pretest and posttest and age at entry, was examined in relationship to the independent variables. All variables within each cluster were entered by themselves in a hierarchical regression on these residuals in order to demonstrate the relative effects of individual variables within a cluster. Then, the relative ability of entire clusters to predict language change was examined by a higher order regression in which all clusters were included simultaneously through a stepwise regression procedure that matched the order that had emerged from the analyses of pretest language level (see Figure 1).

Lastly, several ad hoc analyses were performed to organize data bearing on specific issues identified in the literature review.

Figure 1: Schematic of Research Design


Categories of Independent Variables
Dependent Variables
Cognitive
IQ
Socio-Economic Status
Exploration of interrelationship of variables (6) within cluster
multiple regressions
m.r.
Physical
Interrelationships (18 variables)
m.r.
Language History
Interrelationships (12 variables)
m.r.
Social-Emotional
Interrelationships (16 variables)
m.r.
Program Status
Interrelationships (7 variables)
m.r.
Residualized Language Change Scores
Examination of Intercorrelation
(composite language measure=14 components)
PPVT
Artic
Rdg
0 Higher-order multiple regression strategies to compare relative correlation of entire clusters

CHAPTER IV

RESULTS

Descriptive Information on Study Sample of Language-Disordered Children

The 718 children in the study included 520 (72.4%) males and 198 (27.6%) females, a ratio that is consistent with most studies of learning and language disordered children. The mean age at time of pretest was 7.35 years, [illegible] with no significant difference between males (7.41 years) and females (7.19 years). The range was 3.1-16.4 years.

Because of the previously noted unavailability of background information on large groups of language disordered children in the general literature, this initial section will present descriptive information in somewhat more detail than required for the subsequent analyses. One of the main purposes of the current study was to organize and summarize descriptive and background information available in the archive. Such information is presented here in three categories: demographic/socio-economic background characteristics, physical and developmental characteristics, and social/personality characteristics. A separate section presents performance profiles on the language measures.

Demographic Characteristics of Children at Program Admission

Table 9 indicates in tabular form family and socioeconomic background information for the children in the study. Almost three-fourths of the youngsters were living with both biological parents at the time of referral to the program. The average number of children in these families was 3.33. Eighty-five percent lived in separate homes while 14.5 percent lived in apartments. Socioeconomic status variables were limited to parents' education and occupation; no information on income was available. The sixty-four separate school districts in which study children lived represented communities with extreme divergence in housing costs and median income levels. Communities near the ocean are predominantly middle and upper-middle class professional families. The northern districts represent rural high desert communities. Middle income suburban communities formed the majority of school districts served.

Although the urban center of Los Angeles was not included in this sample (see footnote, page 23), some adjacent districts include large urban, black populations. Several of the districts in eastern Los Angeles County are made up predominantly of Hispanic American families. On average across all districts, 16.6 percent of the children in the study came from families that spoke Spanish or a combination of Spanish and English in the home (a figure which roughly approximates the percentage of Hispanic

Table 9: Demographic Characteristics of Children at Program Admission (N=718)

Age and Sex:

	$\bar{x}$ Age
Male (72.4%):	7.41 yrs.
Female (27.6%):	7.19 yrs.
All	7.35 yrs.

Child Living With:

	%
Both Biological Parents:	74.0
Single or Step Parent:	18.9
Guardian/Foster/Adoptive Parents:	7.1

Parents' Background:

	Father	Mother
Age	$\bar{x}$=35.8 yrs.	$\bar{x}$=32.8 yrs.
Education	%	%
Less than 8 yrs:	15.0	13.6
Some high school:	18.4	20.6
High school grad.	35.6	45.9
Some college:	19.7	14.4
College grad./+	11.3	5.5
Occupation	%	%
Manual/heavy labor:	9.8	27.6
Blue collar/clerk:	44.7	
White collar:	26.5	
Professional:	11.4	
Housewife:		69.7
Unemployed:	7.6	2.7

Residence:

	%
Separate home	85.5
Apartment	14.5

Siblings:

$\bar{x}$=2.33 (range 0-13)

Language Spoken in Home:

	%
English only	77.2
Spanish only	7.8
Spanish and English	8.8
Other only	1.1
Other and English	5.1

Americans living in Los Angeles County as a whole). Another 6.2 percent of students came from bilingual environments other than English (including Japanese, Samoan, French and German). In general, then, language disordered children included in the current study came from a heterogeneous population of varying cultural backgrounds. Intercity black students, however, were underrepresented compared to the total population of Los Angeles County.

Table 9 also shows the educational and occupational levels of parents of the children in the study. Fifteen percent of fathers had less than eight years of formal education, while 13.5 percent of mothers were at this level. Two-thirds of the fathers had at least a high school education, while 11 percent were college graduates. The majority of mothers (65.8%) had graduated from high school, but only 5.5 percent were college graduates. Almost 70 percent of motehrs classified themselves as housewives. Of the 30 percent who did work, 3 percent were currently unemployed. Occupations were assigned along a seven point continuum using the Warner, Meeker, Eell's Revised Scale for Rating Occupation (1949). Less than 10 percent of fathers were employed in manual trades or heavy labor. Blue collar or clerical employees constituted 44.7 percent; 26.5 percent were classified as white collar workers and 11.4 percent professionals; 7.5 percent of fathers were unemployed at the time their child was referred to the program.

No significant differences were noted in these background characteristics when considered by sex of student. There was a tendency for parents of children referred at preschool age to have somewhat higher educational/occupational ratings, but this difference was not statistically significant.

In summary, language disordered children in this study included significant numbers from varying socioeconomic backgrounds, as judged by parents' educational and occupational levels. The sample diversity appears to reflect the diversity within the large population in the Los Angeles County basin: language disordered children, in Los Angeles at least, are found in families from all walks of life and from every cultural and ethnic background.

Physical and Developmental Characteristics

Table 10 summarizes selected physical and developmental characteristics of the study sample presented for the group and additionally broken down by sex. Mean birth weight of the children was 7 lb. 2 oz. with girls weighing, on the average, somewhat less than boys (6 lb. 15 oz. vs. 7 lb. 3 oz.). Age of mother at child's birth was 25.5 years. Developmental milestones were generally in the normal to slow normal range for motor tasks: sitting at 6.8 months, walking at 14.9 months, and age of bowel and bladder control reported at 29.4 months. There was somewhat more variability in age of acquisition of these milestones for girls

Table 10: Physical/Developmental
Characteristics of Children at
Program Admission

	Total (N=718)	Males (N=520)	Females (N=198)
Birthweight*	7 lb. 2 oz.	7 lb. 3 oz.	6 lb. 15 oz.
Age of Mother at Birth	25.5 yrs.	25.4 yrs.	26.1 yrs.
Neurological Indicators	%	%	%
.maternal illness/ accident during pregnancy	26.0	25.1	28.4
.pre- or post-maturity	15.7	15.6	16.1
.Rh factor	9.3	9.1	9.9
.birth complications (jaundice, breathing diff., etc.)	18.8	17.6	22.0
.convulsions	12.9	12.3	14.3
.hyperactive behavior ever observed	42.9 (24.8 curr. prob)	47.2	31.8
.medication for beh./ neuro. control	21.9	22.8	19.5
.EEG performed (% abnormal)	30.8 (51%)	31.0 (46.9%)	30.2 (56.1%)
.medical Dx. of neuro. disorder	28.7	27.3	32.5
Developmental History*	Months	Months	Months
.age first word	21.3	20.8	22.8
.age 2-word sent.	37.6	38.3	35.7
	%	%	%
.age of sitting			
-by 6 months	54.6	55.0	53.6
-by 7-8 months	28.8	28.9	28.5
-by 9 months	16.6	16.2	17.9
	Months	Months	Months
.age of walking	14.9	14.6	15.5
.age toilet trained	29.4	30.3	27.1
Hearing and Vision	%	%	%
Wears Glasses	12.0	11.2	14.4
Wears Hearing Aid	3.4	1.8	7.7
Hearing Levels			
.normal	85.7	87.4	81.3
.mild unilateral loss	4.1	4.3	3.5
.mild bilateral loss	4.2	3.7	5.6
.significant unilateral loss	2.1	2.1	2.0
.significant bilateral loss	3.9	2.5	7.6

*20-40 percent missing data.
Elsewhere less than 10 percent missing.

in the study; more of them sat and walked very early or very late when compared to the boys.

Age of first word was markedly delayed (21.3 months). This delay was especially apparent for girls, who said their first word at an average age of 22.8 months vs. 20.8 months for boys. (Usually girls speak their first words slightly before boys, somewhere in teh 10-12 month range.) The average age of putting together two-word sentences was slightly over three years (37.6 months). This again shows an extreme delay when compared with normal children, who begin to combine words by about 18 months. Girls in the current sample, while slower than boys in using first words, tended to put them together sooner (35.7 months vs. 38.3 months). However, this difference was not statistically significant. It appears that the boys had a more protracted single-word stage (an average of 18 months vs. about 13 months for the girls). Caution must be taken in the interpretation of these data as they are based on parents' recollections, accuracy of which varied greatly depending on the age of child at referral and the number of other children in the family. In addition, there was a great deal of missing data for these "fill-in" items: many parents either could not remember the ages and thus left the items blank or misinterpreted the form and wrote in the first word spoken by the child (almost invariably "mama" or "dada"). With these cautions, however, it does appear that these children who display significant difficulties in oral language use at ages 3.5 to 16 have a history of very delayed onset of speech, with a protracted period of single word usage before combining words into phrases. In contrast, they acquire motor developmental milestones at normal times, or with only slight delays.

Information from medical records as well as that reported by the parents was used to compile indications of potential central nervous system insult or dysfunction. Most of these "neurological indicators" have been documented to a marked degree in populations of language and learning-disabled children. However, many are also present in the histories of children with no behavioral evidence of "brain damage," so interpretation of the percentage figures is difficult. A sizeable minority of the language disordered children in the current study had histories suggestive of brain damage and/or had a medical diagnosis of neurological dysfunction (28.7%). There was a tendency for more girls than boys to have histories of maternal illness or accident during pregnancy (28.4%), prematurity (16.1%), birth complications (22.0%), Rh-factor difficulties (9.9%), convulsions (14.3%) and abnormal E.E.G. records (56.1% of those tested), although none of these differences was statistically significant. Boys, on the other hand, were more likely to be described as "hyperactive" (almost half of the sample at some time prior to program entry had been so judged), and to be on medication for behavioral/neurological control (22.8%). Overall, then, records on 25-30 percent of children in this study indicated evidence of neurological dysfunction. This is probably a low estimate, due to the variability in thoroughness of the medical/ neurological examinations performed. Estimates in previous studies (approximately 40%) were based on consistent and very thorough medical examination procedures performed by physicians familiar with pediatric neurology.

Finally, perceptual functioning was considered for the language-disordered children included in the study. Overall, 12 percent of these children wore glasses. Girls were significantly more likely than boys to have a hearing loss requiring amplification (chi square = 15.20, df=1, $p < .02$). While criteria for program admission ruled out children for whom language delay was due to deafness or a primary peripheral hearing loss, there remained a group of children with educationally useable hearing who were not learning language commensurate with this level. Many of these children had hearing losses in one ear only, or had mild bilateral losses. Some had been in programs for hard of hearing youngsters and had not made expected gains despite amplification and remedial education. All children in the language disorders program with any degree of hearing loss were evaluated by a certified audiologist who concurred that placement was warranted. In addition, these children were reevaluated audiometrically on an annual basis (in addition to yearly hearing screening done by school nurses for all children in the program). Approximately 15 percent of the children in the study had some degree of hearing loss, 12 percent of the boys and 18 percent of the girls. Almost 8 percent of the girls wore a hearing aid; less than 2 percent of the boys did.

In summary, the girls included in this study had a generally non-significant but notably consistent tendency to show more physical and perceptual disabilities than did the boys. They were more likely than boys to have a hearing loss, and they showed more variability in acquisition of motor developmental milestones. Boys seemed to use single words for a longer period of time before combining them. They were also more likely to be described as hyperactive.

Social/Personality Characteristics of Study Children

Data on this final aspect of the children's functioning were gathered from parental report on the questionnaire filled out at time of referral. Although appropriate caution must therefore be taken in actually attributing the reported behaviors and personality characteristics to these youngsters, the way in which a parent perceives the child is nevertheless an important aspect of the social and emotional environment of the home. It certainly is likely to reflect the manner in which parents interpret their children's behavior and respond to their needs. Children with reported behavioral and personality problems are likely to be functioning in a family context of concern, if not crisis. There has been preliminary evidence in the literature suggesting that homes of language disordered children are more isolated from the population at large and are less supportive and less accepting of behavioral aberrations than are homes with non-handicapped youngsters (Wulbert, et al., 1975; Richman and Stevenson, 1977; Elardo, et al., 1977).

Parents of language disordered children in the Los Angeles County program were highly likely to describe their child as "friendly" and "affectionate" (about 80 percent of all parents selected these descriptions with no difference between boys and girls). Almost 60 percent of the children were described as "sensitive," while just about half were characterized as "independent." Somewhat fewer (about 40%) were seen as "nervous" or "fearful." Approximately one-third of program children were rated as "timid," "moody," "irritable" or "bossy." The fewest children (12-14%) were characterized as "sad" and "too near/dependent." Boys were somewhat more frequently called "irritable, moody, or nervous," while more girls were reported as "timid, fearful, and bossy." Again, the sex differences were not statistically significant (see Table 11).

When parents were asked to write down what pleased them most about their child, almost 30 percent mentioned the child's overall personality ("the way she looks at life," "his cheery personality," "his pleasant disposition"). About 20 percent of parents mentioned their child's efforts to achieve ("how hard he tries in school," "the way she never gives up," "his working so hard at sports"). Another 20 percent mentioned family or interpersonal skills ("his kindness to his little brother," "helping me with the housework," "generosity to friends"). Another 9 percent mentioned specific abilities or attributes such as trustworthiness, good looks, or artistic ability. About 18 percent of parents who filled out the form left this item blank.

Parents also had an opportunity to write in the most significant behavior problem presented by the child. Almost 51 percent wrote in "none" or left only that item blank. The most frequent problem (written in by about 20 percent of parents) was hyperactivity. Next most frequently (13.7%) parents reported some form of direct hostility or aggression ("defying me," "hitting his sister," "temper tantrums"). Almost 10 percent of parents mentioned withdrawal or shyness as the child's most significant behavioral disorder. Boys were significantly more likely to have a behavioral problem specified than girls (chi square = 10.55, df=1, $p < .01$).

Between 12 and 25 percent of the language disordered children were reported to exhibit problem behaviors that were presented in a check list format. About 25 percent of the children were reported to have frequent temper

Table 11: Parental Report of Social/ Personality Characteristics of Children at Program Admission

	Total (N=718)	Males (N=520)	Females (N=198)
Characteristics That Describe Child	%	%	%
Friendly	82.5	83.3	80.3
Affectionate	78.9	79.0	78.6
Sensitive	58.2	58.0	58.7
Independent	50.6	49.9	52.6
Nervous	42.2	44.0	37.7
Fearful	38.2	36.3	42.9
Timid	36.2	34.5	40.5
Moody	32.6	33.9	29.4
Irritable	32.5	34.4	27.9
Bossy	31.5	30.7	33.8
Prefers to be Alone	27.4	29.0	23.4
Too Near (dependent)	14.1	14.8	12.5
Sad	12.3	12.2	12.4
Most Significant Behavior Problem			
None	50.9	46.8	61.9
Hyperactivity	20.3	23.4	11.8
Hostility/Aggression	13.7	14.9	10.7
Withdrawal/Shyness	9.7	9.4	10.6
Other (misc.)	5.4	5.5	5.0
Peer Relationships			
Normal	62.5	61.4	65.7
Some Problems	29.5	30.3	27-9
Significant Problems	8.0	8.3	6.4
Receiving Counseling/ Therapy	6.6	7.8	3.5
Behavior(s) That Child Displays			
Temper Tantrums	25.5		
Wetting Bed	25.3		
Fighting	24.6		
Daydreaming	18.6		
Destructiveness	16.6		
Frequent Crying	16.4		
Lying	15.0		
Withdrawing	15.0		
Stuttering	12.2		
Child's Best Asset			
Nothing Mentioned	18.6		
General Personality	29.2		
Achievement Efforts	21.7		
Family/Interpersonal Skills	21.5		
Other (misc.)	9.0		

tantrums, fighting and enuresis; about 12 percent were said to stutter.[1] Crying, withdrawal, destructiveness, lying and daydreaming were all behaviors reported as applying to 15-20 percent of the children.

Over 8 percent of the boys had significant peer relationship difficulties reported, while the comparable figure for girls was 6.4 percent. However, more than 60 percent of both boys and girls were said to have normal relationships with their peers. At the time of their referral to the language disorders program, 6.6 percent of students were enrolled in some form of psychological counseling or therapy. Twice as many of this small group were boys as were girls.

While these data currently cannot be interpreted in relationship to children without language disorders, nor can they necessarily be presumed to reflect these children's personalities and behavior accurately, they do suggest that the majority of parents of the language disordered children in this study describe their children as friendly, affectionate and sensitive. More than half of the children are reported to have normal peer relationships. About 50 percent are described as having a significant behavioral problem; the majority of these problems relate to overactive behavior and are much more common for boys. There are some additional differences in behaviors attributed to girls when compared with boys; girls are more likely to be seen as excessively timid, shy and withdrawn. They are less likely to present problems of hostility and aggression or, indeed, any significant behavioral problem. Such a pattern is perhaps not surprising given the prevalent social stereotypic sex differences ascribed to children without language disorders.

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[1] Less than 7 percent of these children were noted to have clinical symptoms of stuttering on language evaluation. Parents may have been reporting earlier developmental dysfluencies, or they might have interpreted articulation errors as a general speech impediment for which the term stuttering seemed appropriate.

It appears, therefore, that the language disordered children in this study came from diverse cultural and socioeconomic backgrounds, that about 30 percent of them had medical records indicating some central nervous system dysfunction, and that the clear majority were described in largely positive terms by their parents. There were only minor differences between sexes, with girls being more likely to have a significant hearing loss requiring amplification, while boys were more likely to present a significant behavior problem and to be described as hyperactive. The following section examines the pretest performance of these children on the major language, academic and intelligence measures used in subsequent analyses.

Performance Profiles of Language Disordered Children

Table 12 presents the performance profiles of subjects at the time of program admission (pretest level).

Profiles are presented separately for boys and girls as well as for the three age cohorts examined.

The average performance I.Q. score (Leiter IQ or WISC Performance Scale IQ in composite) for children in the study was 92. For the 325 children who were given the entire WISC at program intake, there was an average 18-point difference between the two component scales, Performance and Verbal. Whereas the Performance Scale, which was utilized to qualify the child, showed an average I.Q. of 88, the Verbal Scale score fell in the borderline range (I.Q. 70).

The average child in the study was approximately 7.5 years old, however, the mean age scores on most language tests fell in the 4 to 5 year range. The average number of words used in a sample of recorded spontaneous speech was just under four. The mean grade placement for reading was the ninth month of kindergarten. Spelling scores averaged first month of first grade, while math scores fell near the end of first grade. This meant that, on average, these relatively young language disordered children were already performing one year behind grade expectancy in mathematics with two years' delay in reading and spelling. Over 30 percent were characterized as having a severe articulatory disorder while fully 75 percent of the youngsters had some degree of difficulty with speech-sound production at program admission. Forty-five percent were judged as having suspected oral motor problems, i.e.,

Table 12: Performance Profiles of Children at Program Admission

			Total Group (N=718)	Male (N=520)	Female (N=198)	Preschl (N=233)	Primary (N=324)	Middle+ (N=161)
	Chronological Age	N	7.35 years	7.41 years	7.19 years	4.85 years	7.23 years	11.21 years
I.Q.	Perf. IQ (composite)	(688)	92.1	92.7	90.1	95.4	91.2	89.7**
	Leiter	(421)	92.6	93.4	90.9	95.3	91.0	88.5
	WISC Full Scale	(322)	78.4	78.9	76.6	78.5	78.5	78.3
	Verbal	(325)	40.2	70.5	69.4	72.8	71.3	67.9
	Performance	(379)	88.2	88.5	87.0	87.3	87.8	89.1
			Raw Age (yr/mo)	Raw Age	Raw Age	Raw Age	Raw Age	Raw Age
	Peabody Pict. Voc. Test	(678	47.3 4-9	48.3 4-10	44.6 4-4*	33.1 3-3	49.3 5-0	64.4 7-8
ITPA	Aud. Reception	(711)	17.5 4-8	18.4 4-11	15.2 4-4**	9.8 3-6	17.5 4-8	28.7 6-9
	Aud. Assn.	(713)	13.0 4-7	13.5 4-8	11.5 4-4**	5.9 3-5	13.2 4-7	22.9 6-6
	Verb. Expres.	(705)	15.2 5-0	15.7 5-1	13.8 4-9*	7.0 3-4	16.0 5-2	25.4 6-9
	Gram. Clos.	(702)	8.4 4-6	8.8 4-7	7.5 4-3*	2.7 3-4	8.7 4-7	16.1 5-10
	Aud. Mem.	(707)	13.5 4-1	13.9 4-2	12.4 3-11*	7.6 2-11	14.4 4-3	20.3 5-6
	Vis. Mem.	(681)	14.8 5-6	14.8 5-6	14.3 5-4	9.6 4-3	15.7 5-9	20.3 7-5
N.S.S.T	Receptive	(659)	23.0 5 yrs.	23.3 5 yrs	22.4 5. yrs.	17.0 3 yrs.	23.7 5 yrs.	30.5 7 yrs.
	Expressive	(643)	11.9 3 yrs.	12.2 3 yrs.	11.0 3. yrs.	3.3 3 yrs.	12.2 3 yrs.	23.3 5 yrs.
	Mean Utterance Length	(577)	words/utterance 3.94	words/utter. 3.99	words/utter. 3.82	words/utter. 2.93	words/utter. 4.17	words/utter. 5.21
	Elicited Imitation of 34 Model Sentences	(609)	% correct 36.4	% correct 37.2	% correct 34.2	% correct 14.2	% correct 39.8	% correct 63.2
Oral Mot. Diff.	No Problem	(707)	53.9%	54.2%	53.1%	39.4%	56.6%	69.4%
	Suggestive		33.4%	34.9%	29.4%	39.0%	33.9%	24.4%
	Clear Problem		12.7%	10.9%	17.6%	21.6%	9.5%	6.2%
	Stuttering/Voice Problems	(714)	8.4%	7.5%	10.7%	7.3%	9.0%	8.7%
Articulation	Normal Limits		23.1%	23.2%	23.1%	15.5%	20.6%	39.4%
	Mild Disorder		23.1%	23.0%	23.6%	15.0%	27.5%	26.3%
	Moderate Disorder		21.9%	21.6%	22.6%	21.5%	23.1%	20.0%
	Severe Disorder		31.8%	32.2%	30.8%	48.1%	28.8%	14.4%
Academics			Grade Level[a]	Grade Level	Grade Level	Grade Level	Grade Level	Grade Level
	Reading	(548)	Kg.94	Kg.95	Kg.89	PreKg.1	Kg.9	2.0
	Math	(532)	1.1	1.1	Kg.8	PreKg.6	Kg.9	2.4
	Spelling	(506)	1.0	1.0	Kg.9	Kg.1	Kg.9	1.8

* = $p < .05$
** = $p < .01$
[a] - combined WRAT and PIAT

difficulty in control of tongue, lips, etc., which might affect clear production of speech. Eight percent of program children presented additional difficulties with speech production, in particular stuttering and/or voice disorders (inappropriate pitch, severe hoarseness, breathiness, etc.).

When these performance profiles were stratified by sex, an interesting pattern emerged. While there was no significant difference between boys and girls for age or Performance I.Q., girls scored significantly lower on the Peabody ($t=2.40$, $df=676$, $p < .05$), and on five subtests of the I.T.P.A. (Auditory Reception, $t=3.36$, $df=709$, $p < .01$; Auditory Association, $t=2.71$, $df=711$, $p < .01$; Verbal Expression, $t=2.08$, $df=703$, $p < .05$; Grammatic Closure, $t=2.13$, $df=700$, $p < .05$; and Auditory Memory, $t=2.02$, $df=705$, $p < .05$). Significant differences were not noted for other measures, although the direction in favor of higher average scores for boys was consistent. Apparently girls, at the time of admittance to the Los Angeles County's language disorders program, perform significantly below boys on at least some standardized, formal language measures. Since the proportion of boys versus girls referred to the program is essentially the same as the proportion admitted, it suggests that a sex bias may be operating in referral procedures. It may be that girls must have more serious language impairments before they are referred for special educational treatment.

Significant differences among raw scores for language measures on profiles representing different age cohorts are not surprising because of the effects of maturation on expected language performance. The older children did, in fact, do better than the younger children (in absolute terms at least). For measures with standard scores (ITPA, PPVT, Academics), older students often made less gain relative to the normal standardization population and therefore had declining scaled scores.[2]

The Performance I.Q. variable, a standardized score, suggests that there are some significant differences in I.Q. among the three age cohorts, with younger students showing significantly higher scores than older ones ($F=6.88$, $df=2$, $p< .01$). This means that the younger children included in the current study performed significantly better on a Performance I.Q. measure, in particular the Leiter. There has already been discussion of the heavy emphasis on perceptual functioning measured by this test. Such perceptually-based behavior is characteristic of early developmental levels, and children who display such early abilities and yet do not develop the subsequent linguistic skills to facilitate abstract thinking may "test" higher when they are young. Another difference noted among the age cohorts is the marked decline in children with severe articulation problems. This is paralleled by fewer clinical ratings of significant oral motor problems. Older language disordered students are less likely to have articulation problems or difficulty with control of the speech mechanisms. They are equally likely, however, to have stuttering or voice problems.

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[2] For this reason, raw scores have been used throughout the regression procedures as the most sensitive record of sometime minimal gains.

Prediction of Entry Level Language Performance

A series of regression analyses was carried out using the six clusters of independent variables as "predictors" of language performance. These independent variables were first examined in relation to language level at time of pretest and later as they related to measured gain in language performance over time (2-3 years) in the program. Initially, analyses were run separately for each of the six clusters, then all the clusters were stepped into a single regression using a predetermined order. Results of the analyses of individual clusters in relationship to pretest language performance will be examined first.

Age

The effect of age on the prediction of pretest level was highly significant (see Table 13). Approximately three quarters of the variance in pretest level raw score was accounted for by age. Such a developmental relationship is not surprising--children who are younger score lower--but the strength of this effect is important to consider in interpreting the magnitude of the predictor variables.

Cognitive

The Cognitive cluster was represented by a single variable, Performance I.Q., the performance measure intelligence score necessary to qualify students for program admission (see Title V, Appendix II). As discussed in the descriptive results section, this variable was a composite made up of scores from two performance I.Q. tests, the Leiter International Performance Scale, and the Wechsler Intelligence Scale for Children--Performance Scale. About half of the subjects had received each of these measures. A very few children received both tests at time of program intake (N=117). For those youngsters who did take both tests, the mean score on the Leiter was 86.2 versus 88.2 on the WISC Performance Scale and the correlation was $r=.62$, suggesting caution in interpreting interchangeably.

Table 13 shows the effects of I.Q. on the prediction of pretest levels. While the result is highly significant ($F=30.12$, $df=1,636$, $p < .01$), the actual contribution in terms of percentage variance accounted for is relatively modest (less than 2%). This means that for two language disordered children of the same chronological age, knowing their respective Performance I.Q. scores tells one surprisingly little about their level of performance on language measures.

Socioeconomic

The cluster of six variables relating to socioeconomic status also contributed relatively little to a prediction of pretest language level (see Table 14). The contribution of this cluster above and beyond age was non-significant ($F=1.20$, $df=6,596$, n.s.). Of the individual variables included, fathers' occupation was the strongest. It seems, then, that socioeconomic status (at least when indexed by family size, language spoken in the home, type of residence and parents'

Table 13: Regression on Pretest--
Cognitive Cluster

	R	R^2	R^2 Added	df	F
Age at Entry	.7644	.5842	.5842		
I.Q.	.7765	.6030	.0187	(1,636)	30.12 $p < .01$

Table 14: Regression on Pretest--Socioeconomic Status Cluster

	R	R^2	R^2 Added	df	F
Age at Entry	.7644	.5842	.5842		
Father's Occupation	.7671	.5885	.0043		
Bilingual Home	.7675	.5891	.0006		
Type Residence	.7676	.5892	.0000		
Mother's Education	.7676	.5892	.0000		
Father's Education	.7677	.5893	.0001		
No. Siblings	constant				
Total Cluster			.0051	(6,596)	1.20 N.S.

education and occupation), bears relatively little relation to the language performance level of communication disordered youngsters.

Physical

The Physical cluster consisted of eighteen separate variables which, taken together, contributed significantly to the prediction of pretest level (F=4.08, df=18,595, $p < .01$) (see Table 15). The strongest contribution came from the variable "degree of hearing loss"; other things being equal, language disordered children with hearing losses, even mild losses or a loss in one ear only, will score lower on language measures. Other variables which added to explaining the variance were mother's age at birth, the age at which the child walked, number of accidents, birth complications, medication for behavioral/neurological control, and number of special tests given. The weakest variable, interestingly, was medical diagnosis of a neurological problem. Whether or not a child had been called neurologically impaired by a physician seemed to differentiate little among language levels at pretest.

Language History

Table 16 suggests that language history prior to referral to the program discriminates significantly among the language test performances of the children at time of pretest (F=10.82, df=12,479, $p < .01$). The strongest variables include parental judgments of the child's current ability to use oral language, and to use gesture, as well as to speak

Table 15: Regression on Pretest--Physical Cluster

	R	R^2	R^2 Added	df	F
Age at Entry	.7644	.5842	.5842		
Hearing Loss	.7787	.6063	.0221		
Mother's Age at Birth	.7826	.6125	.0062		
Age Walked	.7852	.6166	.0041		
Accidents (#)	.7874	.6200	.0035		
Birth Complications	.7891	.6227	.0027		
Medication	.7909	.6255	.0028		
Special Tests (#)	.7927	.6284	.0029		
Birth Weight	.7932	.6291	.0007		
Maternal Illness	.7934	.6295	.0004		
Family Hx. Disorders	.7937	.6299	.0004		
Feeding Difficulties	.7938	.6302	.0003		
Illness	.7940	.6305	.0003		
Clumsiness	.7942	.6307	.0003		
Vision Impairment	.7944	.6310	.0003		
Hospitalizations	.7945	.6312	.0002		
Health Providers (#)	.7945	.6313	.0001		
Sleeping Difficulties	.7946	.6313	.0001		
Neurological Dx.	constant				
Total Cluster			.0471	(18,595)	4.08 p .01

Table 16: Regression on Pretest--Language History Cluster

	R	R^2	R^2 Added	df	F
Age at Entry	.7644	.5842	.5842		
Usage	.7953	.6324	.0483		
Gesture	.8105	.6569	.0244		
Artic.-Current	.8190	.6707	.0138		
Age First Words	.8222	.6760	.0053		
Artic.-Change	.8243	.6795	.0035		
Abnormal Crying	.8248	.6803	.0008		
Attention to Caregiver	.8254	.6812	.0009		
Appropriate Speech	.8257	.6819	.0006		
Imitation	.8260	.6823	.0004		
Hearing	.8262	.6827	.0003		
Comprehension	.8265	.6832	.0005		
Age 2-Word Phrase	.8266	.6833	.0002		
Total Cluster			.0991	(12,429)	10.82 $p < .01$

clearly enough to be generally understood. In that sense, results of this cluster might be considered a validation of parental judgments of their children's communicative abilities. The next most contributing variables are age of first word, and judgment of improvement in articulation during the previous six months. The remaining variables all contributed slight, positive amounts to the cluster's effect.

Social-Emotional

The Social-Emotional cluster was represented by sixteen individual variables which, taken together, did not contribute significantly to an explanation of variance in pretest language level (Table 17). The strongest variable was Behavioral Maladjustment, the parents' report of the number of behaviors generally considered indicative of maladjustment (fighting, withdrawal, sleeplessness, lying, etc.) which the child displayed. Whether the child was in therapy, and the degree of physical discipline utilized by parents contributed small, positive loadings. Minor contributions were also made by variables assessing relationships with adults, favorite activities (social vs. isolated), and parental reports of personality characteristics (moody, sad, bossy, friendly, etc.). Two variables, whether the child was reported to have significant behavioral or discipline problems, did not load at all in the summary analysis. However, inspection of partial correlations showed that although these variables in fact made small positive contributions, they shared virtually all of their variance with the first variable, Behavioral Maladjustment.

Table 17: Regression on Pretest--Social Emotional Cluster

	R	R^2	R^2 Added	df	F
Age at Entry	.7644	.5842	.5842		
Behavioral Maladj.	.7672	.5886	.0044		
Child in Therapy	.7694	.5920	.0034		
Method of Discipline	.7711	.5945	.0026		
Fav. Act.-Isolated	.7723	.5965	.0020		
Fav. Act.-Social	.7732	.5979	.0014		
+ Personality	.7741	.5992	.0014		
- Personality	.7749	.6005	.0013		
Relates to Adults	.7761	.6024	.0019		
Marital Status/Parents	.7766	.6031	.0007		
Peer Relations	.7770	.6037	.0006		
Pleases Parent	.7770	.6038	.0002		
Birth Order	.7771	.6039	.0001		
Sibs. with Problems	.7772	.6040	.0001		
Abuse Potential	.7772	.6040	.0000		
Discipline Problems	constant				
Behavior Problems	constant				
Total Cluster			.0198	(16,502)	1.57 N.S.

Program Status

The final cluster was Program Status (see Table 18). This collection of measures focused on program stability, length of enrollment, and recommended disposition (the latter only for the 396 students who had left the program). The variable which was strongest was Recommendation for Subsequent Placement. The rest of the variables contributed small positive loadings, except for Itinerant Program, which actually was a subcategory of the first variable, Recommendations. The nature of this cluster is such that it cannot logically serve as a predictor of pretest functioning. Rather, the fact that it correlates significantly with language performance ($F=13.67$, $df=7,589$, $p < .01$), serves more as a validation of program management decisions, i.e., it shows that those children ultimately leaving the program are the ones with higher language scores. While probably not surprising, it is interesting to note that information for predicting future placement outcomes is given by initial pretest language levels: in general, of those children remaining in the program at least two years, those who start out higher on language measures are more likely to be recommended to return to regular programs. They also tend to remain in the remedial program less time. Of course, there may be differential rates of growth or gain on language measures separate from level of initial functioning. This issue is considered in the following section.

Table 18: Regression on Pretest--Program Status Cluster

	R	R^2	R^2 Added	df	F
Age at Entry	.7644	.5842	.5842		
Rec. for Placement	.7960	.6337	.0495		
Length in Program	.7980	.6368	.0032		
Moves Prior to Enroll.	.7994	.6391	.0023		
Reason for Termination	.8003	.6404	.0013		
Moves in Program	.8007	.6411	.0007		
Enrollment Status	.8014	.6411	.0011		
Itinerant Program	constant				
Total Cluster			.0569	(7,589)	13.67 $p < .01$

Summary Analysis

The explanatory power of the individual clusters of independent variables to account for variance in the pretest language scores was only the first stage of the analysis. Next the predictive power of all the clusters, taken collectively, was examined. To do this, a regression analysis was done including all the clusters of variables entered into the analysis in a prescribed order (Table 19). Utilizing the entire set of variables, approximately 78 percent of the pretest variance could be accounted for. Fifty-eight percent of this total variance was accounted for solely on the basis of age, a highly significant figure ($F=948.38$, $df=1,675$, $p<.01$). This result is hardly surprising: older language disordered students earn higher raw scores. Collectively, the six clusters of variables account for approximately 20 percent of the pretest variance--a significant amount ($F=7.68$, $df=60,585$, $p<.01$), and a substantial portion of the non-age related variance.

The order in which the six clusters is entered into the regression, of course, will affect their relative contribution to the remaining variance since all six clusters are somewhat overlapping, even with the effects of age partialled out. The order was specified a priori and held constant for all regression runs which used all clusters. The rationale for the order chosen was essentially to follow a time continuum: the earlier, more basic measures such as I.Q. and Socioeconomic Status were examined first,

Table 19: Significance of Clusters (Predetermined Order) Regressed on Pretest Level for Composite Language Measure

N (Median)		R	R^2	R^2 Added	df	F
677	Age	.7644	.5842	.5842	(1,675)	948.38**
639	I.Q.	.7765	.6030	.0187	(1,636)	30.12**
603	S.E.S. Cluster	.7803	.6089	.0059	(6,594)	1.49
614	Physical Cluster	.8079	.6527	.0438	(18,605)	4.24**
442	Lang. Hx. Cluster	.8577	.7357	.0830	(12,414)	10.83**
520	Social-Emtl. Cluster	.8658	.7496	.0139	(16,466)	1.62
597	Program Status Cluster	.8826	.7790	.0294	(7,542)	10.28**
Total for all Clsuters				.0948	(60,585)	7.68**

* $p < .05$
** $p < .01$

with later influences, such as reported social-emotional characteristics, being entered later. The "effects" of Program Status were considered last.

Table 19 presents the independent contribution of each of these variable clusters over and above those clusters entered previously. I.Q. adds approximately 2 percent which, while significant (F=30.12, df=1,636, $p < .01$), is less than might be expected based on the earlier canonical correlations (Table 7, page 45) which showed an extremely high overlap between the Cognitive and Language clusters ($r=.91$). The main portion of that shared variance was apparently related to age. The second variable cluster entered was Socioeconomic Status. It contributed less than 0.5 percent, and did not reach significance. The Physical cluster added significantly above I.Q. and Socioeconomic Status in accounting for pretest variability (F=4.24, df=18,605, $p < .01$), although the actual percentage was only slightly over 4 percent. The contribution made by individual variables was spread out across most of the variables within this cluster. The strongest variable once again was degree of hearing loss, with an R^2 added of .02. Age when the child first walked, number of childhood accidents, and mother's age at birth contributed some variance. The weakest variables in this analysis were degree of visual impairment, childhood illnesses and number of hospitalizations, all of which added little or nothing.

The Language History cluster was significant ($F=10.83$, $df=12,414$, $p < .01$), reinforcing the notion that parents' estimates of their child's ability to communicate (verbally or gesturally) provided some information to corroborate functioning levels established by testing. Articulation as judged by parents, improvement in speech over the last six months, and age of first words are also contributing somewhat to this cluster.

The next cluster to be entered was Social Emotional, which barely missed being significant ($F=1.67$, $df=16,466$). Within this cluster, the strongest individual variables remain parental indication of number of behavioral maladjustments (e.g., sleeplessness, fighting, withdrawal) and whether or not the child is enrolled in therapy. Variables which are the weakest for contributing to prediction of language scores at pretest in this total cluster analysis include marital status of parents, suspected physical punishment for behavioral disorders, and whether or not the child prefers social or isolated play activities. The remaining ten variables fall in a mid range and contribute discernible, yet very small amounts.

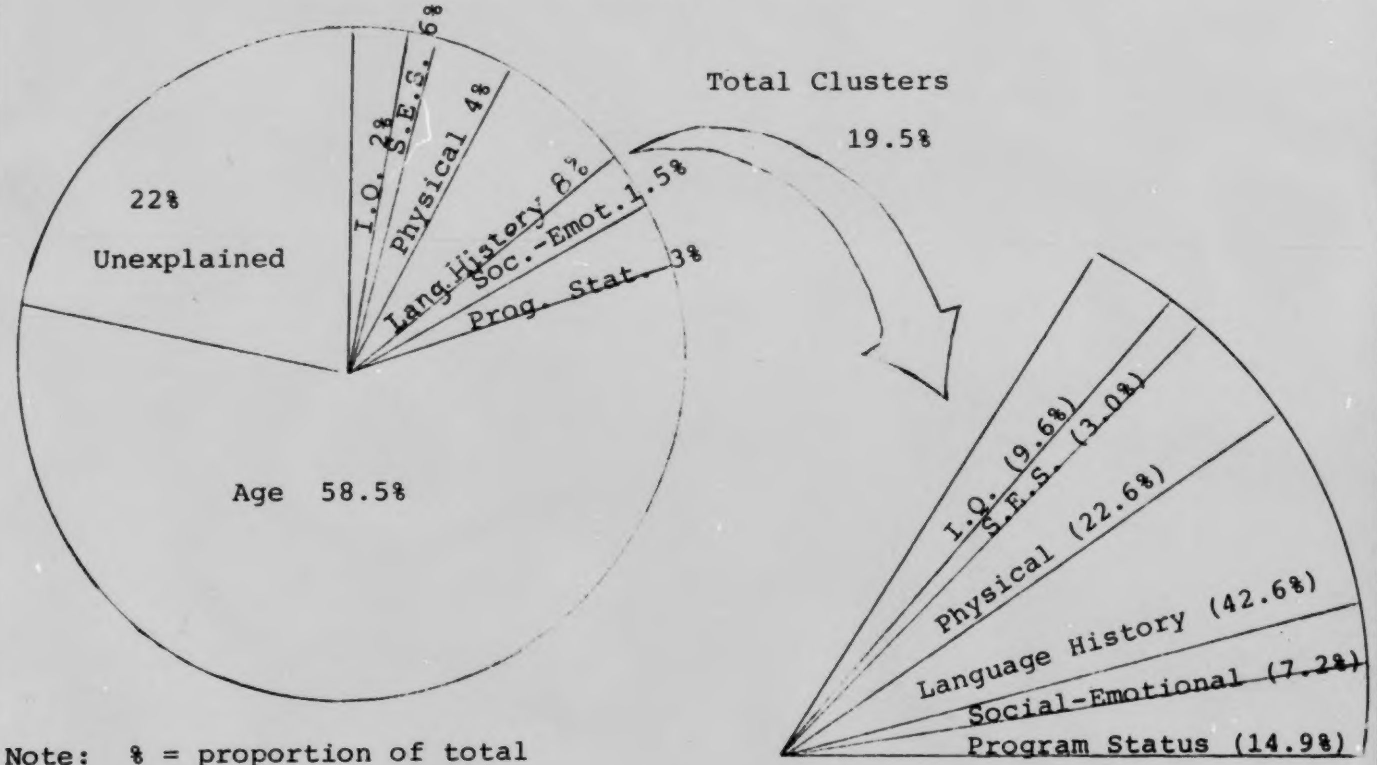
The last cluster entered in this higher order regression procedure was Program Status. This information was, as mentioned previously, not available at time of program admission (pretest). The fact that it nevertheless contributes significantly to explaining pretest variance ($F=10.28$, $df=7,541$, $p < .01$), even after effects of all other variables are removed, suggests that the effect is robust. The strongest variable, as in the individual cluster analysis, is Recommendation at time of dismissal (e.g., staff judgment on most appropriate subsequent educational environment for the child).

Figure 2 represents the contributions of the various clusters graphically. The circle represents the total variance in the pretest measure; 58.5 percent of the variance is accounted for on the basis of age. An additional 19.5 percent is accounted for by the six clusters of independent variables. The actual percentage of total variance accounted for by each cluster, over and above that accounted for by age and the earlier clusters, is indicated with the order of entry into the regression being indicated by numbers on the circumference of the circle. The enlargement shows the relative percentage of the total cluster variance contributed by each cluster individually. Approximately 22 percent of the variance in pretest level remains unexplained.

Prediction of Amount of Improvement in Language Performance

The main task of the current study was to document characteristics of language disordered children at intake that correlated significantly with language gain (as measured by formal and informal language tests administered two to three years after pretest). In other words, what kinds of things do we know about program children that will

Figure 2: Proportion of Variance in Pretest Measures Attributable to Selected Factors



Note: % = proportion of total variance

Note: % = proportion of total cluster variance contributed by each cluster help us predict which ones will make the most gain on language measures over two to three years in the program? Multiple regression procedures were utilized for the reasons outlined in the methodology section. First, the pretest level was partialled from posttest scores and then the effect of varying intervals between tests was removed. The age of the student was entered next, allowing examinaation of the effects of age by itself, over and above that accounted for by pretest levels.

Then, as with the analysis on the pretest level, gain was examined as a function of the six clusters of variables, first individually, then in a higher order regression utilizing all six clusters simultaneously.

Age

The R^2 added by the age variable was .0253, which was significant (F=53.99, df=1,554, $p < .01$) (see Table 20). Evidentally age level by itself contributes a small yet significant amount toward explaining variance on the gain made by these language disordered children. Younger children showed more improvement than older children at the same pretest level.

Intelligence

Table 21 indicates the contribution the child's Performance I.Q. score makes toward predicting relative gain in language. The R^2 added is less than 1 percent (.0092) which, while statistically significant (F=19.58, df=1,525, $p < .02$), explains very little (in absolute terms) of the

Table 20: Regression on Gain for Pretest, Interval and Age

	R	R^2	R^2 Added	df	F
Pretest Level	.8273	.6844	.6844	(1,556)	1205.78**
Interval b/w Tests	.8463	.7162	.0318	(1,555)	69.25**
Age	.8611	.7414	.0253	(1,554)	53.99**

* $p < .05$
** $p < .01$

Table 21: Regression on Gain--Cognitive Cluster

	R	R^2	R^2 Added	df	F
Pretest, Interval, Age	.8611	.7414			
Performance I.Q.	.8664	.7507	.0092		
Total Cluster			.0092	(1,525)	19.58 p .01

variation in gain. In other words, knowing the Performance I.Q. of a child entering the program will tell you something, but remarkably little, about his/her likelihood of making gains on language measures when tested between two and three years later.

Socioeconomic

The effect of Socioeconomic Status on relative gain in language is presented in Table 22. The cluster as a whole does not contribute significantly (F=.57, df=6,547, N.S.). The strongest variable is mother's level of education. Father's educational level also contributed some variance, but this effect was mostly removed when mother's education was regressed out, since the two variables were very highly intercorrelated (r=.66). Father's occupation and number of siblings added very small amounts to the equation. In general, socioeconomic status, at least as indexed by these variables, has little explanatory power for predicting relative language gain with this population of language disordered children.

Physical

The next cluster to be considered was the Physical cluster (see Table 23). While this cluster had contributed significantly to determination of pretest language levels, it bore a nonsignificant relationship to language gain (F=1.19, df=18,495, N.S.). Interestingly, the individual variable contributing most in this residualized gain score regression, medical diagnosis of neurological impairment,

Table 22: Regression on Gain--Socioeconomic Status Cluster

	R	R^2	R^2 Added	df	F
Pretest, Interval, Age	.8611	.7414			
Mother's Education	.8619	.7428	.0014		
Father's Occupation	.8619	.7429	.0001		
No. Siblings	.8620	.7430	.0001		
Bilingual Environment	.8620	.7430	.0000		
Father's Education	constant				
Residence	constant				
Total Cluster			.0016	(6,547)	.57 N.S.

Table 23: Regression on Gain--Physical Cluster

	R	R^2	R^2 Added	df	F
Pretest, Interval, Age	.8611	.7414			
Neurological Dx.	.8629	.7446	.0031		
Hearing Loss	.8640	.7465	.0018		
Maternal Illness	.8647	.7477	.0013		
Special Tests (#)	.8652	.7485	.0008		
Health Providers (#)	.8659	.7498	.0012		
Family Hx. Disorders	.8662	.7503	.0006		
Birth Complications	.8665	.7509	.0006		
Medication	.8668	.7513	.0004		
Age Walked	.8670	.7516	.0003		
Birth Weight	.8671	.7518	.0002		
Feeding Problems	.8672	.7520	.0001		
Accidents (#)	.8672	.7520	.0001		
Clumsiness	.8672	.7521	.0000		
Sleeping Problems	.8672	.7521	.0000		
Illness	.8673	.7521	.0000		
Mother's Age at Birth	constant				
Hospitalizations	constant				
Vision Impairment	constant				
Total Cluster			.0107	.18,495)	1.19 N.S.

had been the very weakest in the prediction of pretest levels. Evidentally, the 30 percent of study children whom doctors identified as having evidence of neurological dysfunction made significantly less gain in language over two to three years, although at the time of initial evaluation they showed no systematic difference in language level. Other variables, such as hearing loss, birth complications, maternal illness, special tests administered, birth weight and age of walking, made small positive contributions toward accounting for variance in the residualized gain (much as they had functioned toward prediction of pretest levels). Degree of visual impairment and number of hospitalizations remain weak variables. But mothers' age at birth of child, while a very strong variable for the pretest analysis, appears to have virtually no relationship to gain.

Language History

The Language History cluster (Table 24) overall did not contribute significantly to predictions of variance on gain (F=1.30, df=12,361, N.S.). In contrast to its highly significant effect in predicting pretest language scores, where variables representing parents' estimates of child's communication ability at time of referral were not most contributory (Usage, Gesture), the strongest variables for predicting gain on the composite language measure include two variables having to do with an "interpersonal orientation" in early life, e.g., Abnormal Crying in Infancy, and Attention to Caregiver. The child's ability to use gesture

Table 24: Regression on Gain--Language History Cluster

	R	R^2	R^2 Added	df	F
Pretest, Interval, Age	.8611	.7414			
Abnormal Crying	.8641	.7466	.0051		
Articulation	.8661	.7501	.0035		
Attention to Caregiver	.8671	.7519	.0017		
Gesture	.8681	.7537	.0018		
Age 2-Word Phrase	.8685	.7544	.0007		
Age First Words	.8690	.7552	.0008		
Comprehension	.8693	.7557	.0005		
Articulation Change	.8696	.7563	.0005		
Imitation of Speech	.8699	.7567	.0004		
Appropriate Speech	.8700	.7569	.0002		
Usage of Speech--Current Level	.8701	.7571	.0002		
Hearing	.8701	.7571	.0000		
Total Cluster			.0157	(12,361)	1.30 N.S.

and his/her articulation ability at the time of referral load positively in this analysis of change, as they did in the pretest analysis. The other variables all contribute slightly, with the exception of Hearing (parents' estimates of child's ability to respond to sounds/speech). This variable added nothing to prediction of either the pretest level or the gain score (change) analyses. Since the actual degree of hearing loss (Physical cluster) was a very strong variable in both analyses, it seems possible that parents' judgments of their child's level of hearing may not reflect actual acuity levels.

Social-Emotional

The next cluster to be examined in relation to language gain is Social-Emotional. Table 25 shows that, overall, this cluster made a small, positive contribution--enough to be significant at the $p < .05$ level ($F=1.79$, $df=16,418$). The variable that contributed most to explaining variance in gain was whether parents considered the child to be a significant behavior problem at the time of referral with those children with fewer behavioral problems evidencing the most gain. Other strong variables were a clear preference for isolated play activities on the part of the child (Fav. Act. Isolated), and number of positive comments concerning the child written in by the parent (Pleases Parent). Most of the other variables contributed small positive increments, with peer and adult relationships, ratings by parents of the child's personality characteristics

Table 25: Regression on Language Gain--Social-Emotional Cluster

	R	R^2	R^2 Added	df	F
Pretest, Interval, Age	.8611	.7414			
Behavior Problems	.8642	.7469	.0054		
Fav. Act.-Isolated	.8659	.7497	.0028		
Pleases Parent (#)	.8673	.7522	.0025		
Sibs. Problem	.8680	.7534	.0013		
Abuse Potential	.8685	.7542	.0008		
Behavioral Maladj.	.8690	.7552	.0010		
Child in Therapy	.8694	.7559	.0007		
Fav. Act.-Social	.8698	.7566	.0007		
Meth. of Discipline	.8700	.7570	.0004		
Marital Status Parents	.8703	.7574	.0004		
Birth Order	.8704	.7577	.0003		
+ Personality	.8705	.7578	.0002		
Adult Relationships	.8706	.7579	.0001		
- Personality	.8706	.7579	.0000		
Peer Relationships	.8706	.7580	.0000		
Discipline Prob.	constant				
Total Cluster			.0166	(16,418)	1.79 $p < .05$

(negative or positive), and whether the child presented a significant discipline problem contributing least. (Although Peer Relations and Discipline contributed little or no additional R^2 in the summary analysis, examination of earlier partial correlations indicated that they had small positive correlations that overlapped some variables that were removed relatively early in the procedure.) In summary, the Social-Emotional cluster, while not contributing significantly to explanation of pretest levels for these language-disordered children, did supply a significant contribution toward explaining variance in gain on a composite language measure over a two to three year interval.

Program Status

The last cluster is Program Status, which includes variables relating to final disposition of youngsters from the program, including whether or not they are still enrolled, length of time in the program, and reason for discharge (where appropriate) as well as staff recommendation for subsequent placement. As is apparent from Table 26, this cluster is highly significant (F=32.59, df=7,538, $p < .01$), with Recommendation for placement the strongest variable (as it was for regression on pretest). This suggests that rate of progress in the program plays a significant role in staff recommendations at time of dismissal in addition to the earlier noted effect of initial pretest level. The relative roles initial language level and change

Table 26: Regression on Gain--Program Status Cluster

	R	R^2	R^2 Added	df	F
Pretest, Interval, Age	.8611	.7414			
Recommend. for Placement	.8872	.7871	.0457		
Length of Time in Program	.8937	.7988	.0117		
Reason for Discharge	.8991	.8084	.0096		
Itinerant Program	.9024	.8144	.0060		
Enrollment Status	.9041	.8174	.0030		
Moves Within Program	.9047	.8184	.0010		
Moves Prior to Enrollment	constant				
Total Cluster			.0770	(7,538)	32.59 p .01

over time play in determining staff recommendations for future educational placement is an interesting issue. Both seem to contribute significantly; children with higher initial language performances are more likely to return to regular education environments. So are those who make the most gain in language abilities.

Summary Analysis

The final regression procedure performed on the composite language dependent variable included all six clusters stepped into the regression in the same predetermined order as was applied in the analysis of pretest level. Table 27 shows the contribution made by each of these clusters over and above the variance accounted for by previous clusters. Pretest level accounted for approximately 68.5 percent of the variance on the residualized gain scores. The pre- posttest interval explained an additional 3 percent, a significant amount ($F=69.25$, $df=1,555$, $p < .01$) but with no practical importance. Age, as mentioned previously, added significant information over and above knowledge of pretest level ($F=53.99$, $df=1,554$, $p < .01$). The Performance I.Q. contributed significant although small predictive power ($F=8.39$, $df=1,525$, $p < .01$) identical to the individual cluster contribution, since this was the initial cluster entered. The Socioeconomic Status cluster continued to be non-significant ($F=.66$, $df=6,543$) with mother's education still the strongest variable for prediction of change. The

Table 27: Significance of Clusters (Entered Stepwise/ Predetermined) Regressed on Change Residuals for Composite Language Measure

N (Median)		R	R^2	R^2 Added	df	F
558	Pretest Level	.8273	.6844	.6844	(1,556)	1205.78**
558	Prepost Interval	.8463	.7162	.0318	(1,555)	69.25**
558	Age	.8611	.7414	.0253	(1,554)	53.99**
530	I.Q.	.8664	.7507	.0092	(1,525)	8.39**
554	S.E.S. Cluster	.8675	.7525	.0018	(6,543)	0.66
517	Physical Cluster	.8749	.7654	.0029	(18,488)	1.49
375	Language Hx. Cluster	.8806	.7755	.0101	(12,334)	1.25
438	Social-Emt. Cluster	.8894	.7910	.0155	(16,382)	1.77*
546	Program Status Cluster	.9343	.8730	.0820	(7,490)	45.19**
Total for all Clusters				.1786	(62,436)	10.44**

* $p < .05$
** $p < .01$

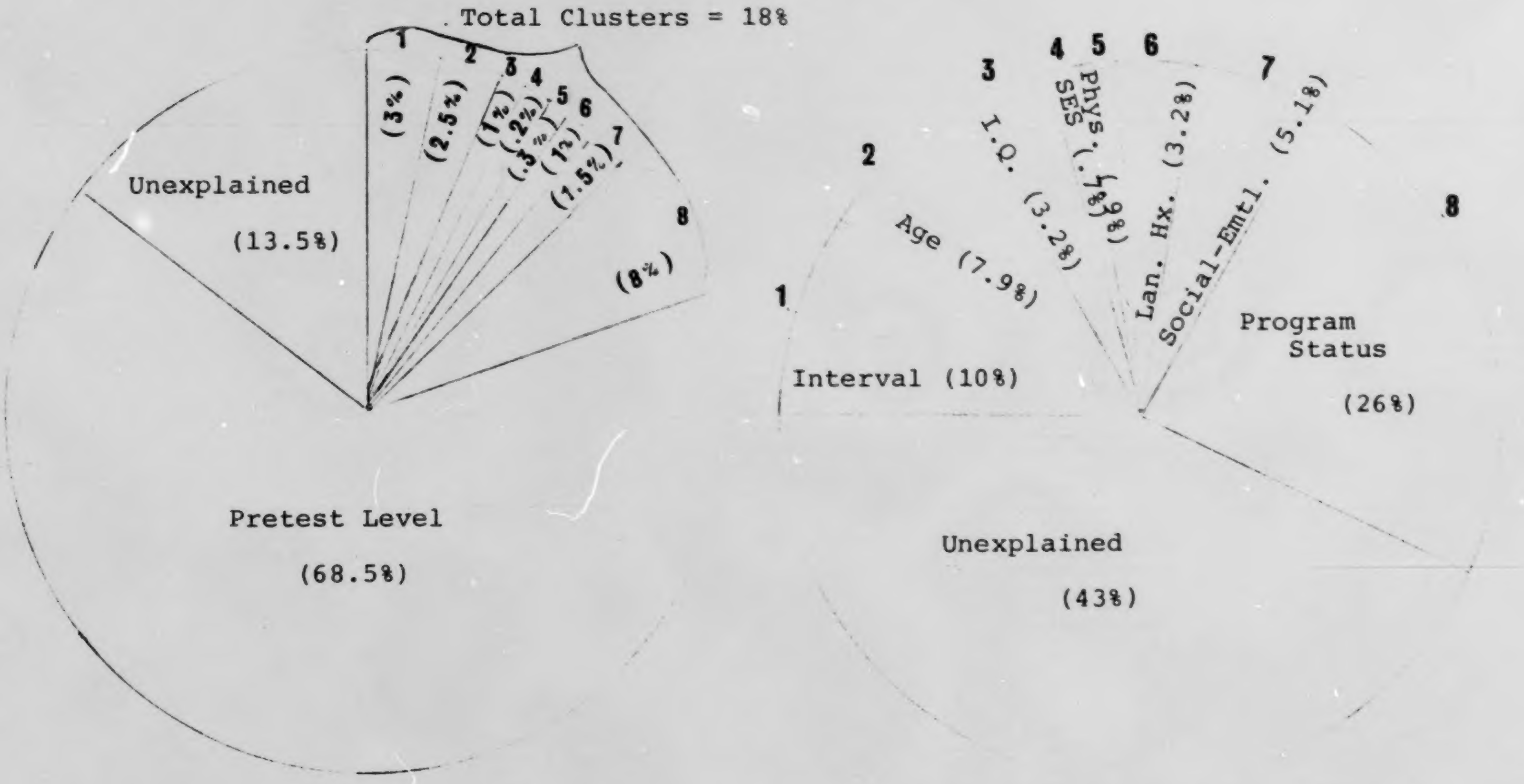
other socioeconomic status variables contributed very insignificant amounts. The Physical cluster was not significant for prediction of gain (F=1.49, df=18,488). Those variables which were most contributory when this cluster was regressed independently on gain here continued to contribute what little variance was accounted for, e.g., neurological diagnosis, hearing loss, number of special tests performed, birth complications, maternal illness, and number of health providers. Similarly, weak variables in the earlier analysis (sleeping difficulties, accidents, and hospitalizations) continued to contribute nothing to predictive power of the cluster. The Language History cluster was likewise non-significant in this stepwise regression procedure (F=1.25, df=12,334). Articulatory ability, abnormal crying in infancy, attention to caregiver and use of gesture continued to be the strongest variables.

Contribution of the Social Emotional cluster was significant at the $p < .05$ level, even after effects of the previous four clusters had been removed (F=1.77, df=16,382). The contributing effects were scattered across almost all of the variables with the strongest ones remaining fairly consistent when compared with the regression of this cluster alone on gain residuals. That is, a clear preference for isolated activities, being characterized by parents as a behavior problem at the time of referral, enrollment in counseling, fewer positive comments by parents, and the use of physical methods of discipline are all related to less language gain for program children.

The final cluster entered, Program Status, accounted for significant additional variance ($F=45.19$, $df=7,490$, $p < .01$). The predominant variable remained staff recommendation for subsequent educational placement upon program termination (R^2 added = .044) with reason for termination also contributing significantly (R^2 added = .019). As in the pretest analysis, rather than providing information useful for the prediction of relative gain, significance of this cluster suggested a validation of program management decisions. Those children who made the most gain on language tests over a two to three year interval were more likely to be returned to regular educational settings.

Figure 3 represents the relative contribution of the various categories of independent variables to the variance in gain at time of posttest. The majority of posttest variance is accounted for by pretest level (68.5%). The varying factors under study together account for approximately 18 percent of the variance, leaving 13.5 percent unexplained. This is an interesting finding in that an extremely wide range of variables, representing just about everything professional staff could think of to ask about the nature and origins of language disordered children's difficulties, was included in the analysis. Despite this, there remains a relatively large proportion of variance

Figure 3: Proportion of Variance in Posttest Level and Residualized Gain Attributable to Study Variables



% = proportion of total posttest variance

% = proportion of variance on residualized gain unexplained, both for pretest level and gain in language scores made over two to three years.

Of the variance that can be accounted for, 2.5 percent is attributable to age levels over and above pretest level. I.Q. on a performance scale contributes an additional 1 percent, a small but statistically significant amount. Socioeconomic status (.2%) and Language History variables (1%) do not make significant contributions to explanation of variance in gain. The final clusters, Social-Emotional, which accounts for 1.5 percent, and Program Status (approximately 8 %) are both significant. The second circle in Figure 3 shows the proportion of variance in residualized gain scores contributed by each research factor. The order of inclusion in the overall regression analysis is noted.

Subanalyses: Individual Tests as Dependent Variables and Differences Among Age Cohorts

All of the foregoing analyses have been based on the composite dependent variable which was constructed by adding standardized scores from fourteen separate language measures. The advantage of this procedure for providing a robust and reliable general language index have been discussed previously. However, such a composite score can potentially mask interesting effects on individual measures of language performance. For this reason, three separate measures from the composite language variable were selected for separate analysis. The three measures chosen represented the most distinct (or divergent) aspects of language incorporated into the composite measure. The Peabody Picture Vocabulary Test (PPVT) represents a very production-free measure of language: the child is required to point to pictures when presented with a verbal label. This test is well standardized, is highly reliable and was the language measure which correlated the highest with the principal language factor that emerged in the factor analysis procedure. To a large degree it might be considered a single measure representation of the composite dependent variable and, as such, might serve as a cross validation of the results obtained with the composite variable. The other two measures selected for independent consideration, Articulation rating and Reading score, represented the language-related skills that seemed least like the overall measure. Articulation ability is predominantly a measure of the production of speech (the clarity with which it is spoken) and, in theory at least, it can be very distinct from a general language ability. For example, a cerebral-palsied child with brain damage involving the nerves to the speech mechanism may have slurred or difficult-to-understand speech while still comprehending what he hears quite adequately and expressing his thoughts in normal (if poorly produced) sentence structure and vocabulary. Articulation, along with ratings of oral motor ability, had correlated somewhat lower with other language measures and had loaded somewhat less with the first principal component in the factor analysis. Reading performance was chosen as a third measure for separate analysis because of the indication on the posttest factor analysis that it no longer loaded predominantly with the first principal factor. This was also of theoretical interest since concern about the relation of reading (written language) to oral language abilities (or disabilities) was noted frequently in previous literature.

Additional subanalyses were conducted in order to check the interaction effect of age. The main analysis had lumped all language disordered students together regardless of age cohort. The effects of age had been partialled out before subsequent cluster analyses were run, and these effects had been significant, indicating some contribution to predictive ability attributable to age alone. There was still the possibility that an interaction effect between age level and language level for relative gain was being masked. For that reason a separate analysis of the six clusters was run on the Peabody language measure broken down by the three age cohorts utilized throughout this study (preschool, primary, and middle grade).

Tables 28 and 29 summarize the results of analyses of the independent variable clusters regressed in the same order on both pretest level and residualized gain scores for the three separate language variables. It also includes the age cohort analysis for the Peabody Picture Vocabulary Test. Comparison of the individual variables will be discussed first.

Table 28: Cumulative R^2 and Significance Levels for Clusters Regressed on Pretest Level Comparing Composite Language Measure, Three Individual Language Measures, and Age Cohort Groups

					P.P.V.T. by Age Cohort[a]		
	Composite ($\bar{x}$N=570)	P.P.V.T. ($\bar{x}$N=580)	Artic. ($\bar{x}$N=578)	Reading ($\bar{x}$N=502)	Preschol. ($\bar{x}$N=191)	Primary ($\bar{x}$N=263)	Middle+ ($\bar{x}$N=126)
	Cum. R^2	Cum. R^2	Cum. R^2	Cum. R^2	Cum. R^2	Cum. R^2	Cum. R^2
Age	.5842**	.4540**	.1055**	.4306**	.0639**	.1291**	.1362**
I.Q.	.6030**	.4707**	.1063	.4497**	.0936**	.1497**	.1834**
S.E.S.	.6089	.4789	.1224	.4823**	.1205	.1497	.1840
Physical	.6527**	.5313**	.2026**	.5100	.1523	.2633**	.2493
Lang. Hx.	.7357**	.5984**	.2907**	.5417**	.2123	.3142**	.3276
Soc. Emtl.	.7496	.6141	.3312*	.5833**	.2371	.3793**	.3524
Prog. Status	.7790**	.6445**	.3583**	.6192**	.3430**	.5361**	.4675**
Total R^2	.7790	.6445	.3583	.6192	.3430	.5361	.4675
R^2 Added by 6 Study Variable Clusters	.1948	.1905	.2528	.1886	.2791	.4070	.3313

[a] Because of the restrictions caused by lowered N, it was not possible to include all variables within each of the 5 clusters (S.E.S. → Prog. Status) in these analyses. Therefore, based on earlier regressions, those variables with the highest R^2 Added were chosen to summarize each cluster.

* = $p < .05$

** = $p < .01$

Table 29: Cumulative R^2 and Significance Levels for Clusters Regressed on Change Residuals for Composite Language Measure, Three Individual Language Measures and Age Cohort Groups

					P.P.V.T. by Age Cohort[a]		
	Composite $(\bar{x}N=494)$	P.P.V.T. $(\bar{x}N=553)$	Artic. $(\bar{x}N=575)$	Reading $(\bar{x}N=498)$	Preschl. $(\bar{x}N=187)$	Primary $(\bar{x}N=256)$	Middle+ $(\bar{x}N=110)$
	Cum. R^2	Cum. R^2	Cum. R^2	Cum. R^2	Cum. R^2	Cum. R^2	Cum. R^2
Pretest Level	.6844**	.5757**	.4915**	.5407**	.3133**	.4888**	.5616**
Interval	.7162**	.5993**	.4977**	.5702**	.3582**	.5413**	.5663
Age	.7414**	.6026**	.4978	.5705	.3693	.5434	.5664
I.Q.	.7507**	.6093**	.5012**	.5773**	.4133**	.5447	.5666
S.E.S.	.7525	.6162	.5043	.5793	.4171	.5507	.5828
Physical	.7654	.6537**	.5304*	.5989	.4595	.5899**	.6147
Lang. Hx.	.7755	.6746*	.5555*	.6296**	.4828	.6294**	.6315
Soc. Emtl.	.7910*	.6915	.5749	.6577**	.5063	.6429	.6628
Prog. Status	.8730**	.7198**	.6150**	.7299**	.5815**	.6829**	.6659
Total R^2	.8730	.7198	.6150	.7299	.5815	.6829	.6659
R^2 Added by 6 Study Variable Clusters	R^2 Added .1316	R^2 Added .1172	R^2 Added .1172	R^2 Added .1594	R^2 Added .2122	R^2 Added .1395	R^2 Added .0995

[a] Because of the restrictions caused by lowered N, it was not possible to include all variables within each of the 5 clusters (S.E.S. → Prog. Status) in these analyses. Therefore, based on earlier regressions, those variables with the highest R^2 Added were chosen to summarize each cluster.

$* = p < .05$

$** = p < .01$

Prediction of Language Level and Improvement Using Individual Language Measures

The variance in pretest level which could be accounted for by the total group of research factors is shown in Table 28. It is interesting to compare the composite language measure with the three individual component measures. Seventy-eight percent of the composite score could be accounted for as compared with 64 percent of the variance on pretest level of the Peabody Picture Vocabulary Test and 62 percent of Reading grade scores. Only a total of 36 percent of the total variance on pretest level of articulation was explained. This suggests that the composite score may have provided a broader, more thorough index of overall language ability. The percentage of variance accounted for over and above the effects of age (e.g. by the six research factors) provides another comparison. Nineteen and one-half percent of total pretest variance was accounted for in the Composite measure while 19 percent of Reading and PPVT were explained. Twenty-five percent of the Articulation pretest variance was accounted for. Overall, these percentages are quite similar, pointing out that the main differences in overall variance lay in the first regression, Age. Age level explained 58 percent of the variance in the general (composite) language measure, while only 10 percent of variance in articulation ability was similarly attributable.

The pattern of the relative contribution made by each of the six clusters to the variance explained for each individual language measure highlights some differences among specific aspects of the general language measure. The clusters of predictor variables were entered as functional sets in the same specified order in all four analyses. While the clusters which added significant R^2 over and above previous clusters were identical for the composite measure and the P.P.V.T., the other two individual language measures behaved somewhat differently.

Articulation pretest level, uniquely among the language measures considered, was *not* significantly predicted by I.Q. In other words, level of cognitive functioning did not help predict ratings of clarity of speech at program admission, in contrast to having provided some predictive information for Reading, Peabody Test, and the Composite language measure. Another difference between regressions on articulation and on the composite measure (or the P.P.V.T.) was in the Social-Emotional cluster: variables in the Social-Emotional cluster added significant information over and above previous clusters in predicting pretest articulation ratings ($F=1.84$, $df=16,485$, $p < .05$).

A somewhat different pattern is shown by the cumulative R^2's for Reading. Here the amount of variance explained by socio-economic status variables was significant--the only time this cluster reached significance in any analysis throughout the study ($F=5.15$, $df=6,491$, $p < .01$).

Children from families with higher educational and occupational levels scored higher on standardized reading tests at the time of program admission. Another distinctive result shown by the regressions on Reading indicated that the Physical cluster was non-significant in predicting pretest level (whereas the Physical cluster did contribute significantly for the other three variables). Finally, Social-Emotional variables contributed significantly to predicting pretest levels in reading ($F=2.78$, $df=16,445$, $p < .01$). Thus it appears that the power of the six individual clusters of variables to predict pretest level varied depending on the language test considered. The composite language measure and the P.P.V.T. operated very similarly while some unique relationships were apparent for measures of articulation and reading.

Table 29 contrasts the ability of the various research factors to predict variance on residualized gain scores for the composite language measure in contrast to three individual measures. Once again we see that the greatest total variance could be explained using the composite measure (87% as compared with 73% for Reading, 72% for P.P.V.T., and 61% for Articulation). The variance accounted for solely by the six clusters of predictor variables, e.g., above and beyond the effects of intake level and age, was 13 percent for the composite measure and 12 percent for P.P.V.T. and for Articulation. Gain in reading grade levels could be predicted somewhat better by the six clusters (16%), although this result was not markedly different from the others.

The pattern of cluster significance for predicting gain in the four language measures was at least as variable as when predicting pretest levels. Some relationships seemed fairly constant: I.Q. and Program Status variables contributed significantly to gain regardless of language measure used; the contribution of Socioeconomic Status was in no case significant. But in this series of regressions, the P.P.V.T. acted as differently from the Composite variable as did either Reading or Articulation. The Physical cluster, while contributing nonsignificantly to predictions of gain on the Composite language measure and Reading, *was* significant for Articulation (F=1.89, df=18,611, $p < .05$) and the Peabody (F=3.56, df=18,591, $p < .01$). Interestingly, the Language History cluster was significant for all three individual language measures, but did *not* contribute significantly to predictions of gain for the Composite measure, suggesting that probably many of the eleven other components of the composite were not strongly related to parents' reports of early language development. Although the Social-Emotional cluster was significant in the analysis predicting gain on the Composite language score (F=1.77, df=16,382, $p < .05$), when considering individual component variables, it had a significant relationship only with Reading (F=2.27, df=16,443, $p < .01$).

Finally, the predictive influence of age level, partialled out before the clusters of independent variables were considered, was nonsignificant for predicting gain in Reading and Articulation scores. These two measures, in contrast to the P.P.V.T. and the Composite measure, seem to change over two to three years independent of the actual chronological age of the child.

So it seems that in considering the clusters of independent variables for the prediction of change, each of the three individual component variables acted differently from one another in at least two instances. Additionally, all three suggested patterns of relative contribution by research factors which were different from those seen when the composite language variable was used as an outcome measure.

In summary, the individual language measures (at least the three selected for examination as potentially most dissimilar) do, in fact, show somewhat different patterns of variance explained by the various clusters of predictor variables. The Composite measure, while more reliable and statistically stable, may mask some potentially interesting relationships with individual components of overall language ability, both for predicting pretest level and change.

Prediction of Language Performance for Separate Age Cohorts

An analysis of both pretest level and residualized gain scores for the Peabody Picture Vocabulary Test was made for each of the three age cohorts (see Tables 28 and

29). The P.P.V.T. was selected because it was the most routinely administered pre-post measure in this archive, as well as representing a "general" language function, which conceptually approximated the composite score. Because of the statistical restrictions imposed by the reduced number of subjects when divided into age groups in the cohort analysis, it was not possible to include all variables within each of the five clusters (the Cognitive cluster had routinely been represented by one variable, Performance I.Q.). Therefore, the earlier analyses of the total group for P.P.V.T. and Composite language scores were utilized to identify individual variables within each cluster which had the highest R^2 added. These strongest variables were selected to represent or summarize the cluster for the age cohort analysis. The variables retained in each cluster are listed in Appendix VIII.

Table 28 indicates that the greatest overall variance in pretest level for the Peabody was explained by the research factors when applied to the primary age cohort (54% versus 47% for middle grade and 34% for preschool). The proportion of explained variance which was contributed only by the six clusters of predictor variables mirrored this ranking: the greatest amount for primary, followed by middle grade and then preschool. Although not surprising, it is interesting to note that where the effects of age were controlled by using a cohort stratification, the R^2 added by the research factors was higher. Even so, the overall percentage of variance explained for each age cohort was considerably lower than for the P.P.V.T. analysis using the total group of children.

The pattern of significant contributions made by each additional research factor to the Peabody pretest score can be compared by age cohorts versus the total group. The effects of Age, I.Q., S.E.S. and Program Status were consistent across all age levels. However, the primary level age cohort alone showed a significant additional contribution made by Physical, Language History, and Social-Emotional clusters. In all cases except Social-Emotional, this effect was strong enough to influence the significance calculations for the total group analysis.

Examination of the variance in gain accounted for on P.P.V.T. for the total group versus the three age cohorts reveals some additional differences. The significant contribution made by I.Q. to the total group analysis could be attributed almost entirely to the affects of this factor on preschool children. Similarly, the predictive power of the Physical and Language History clusters for the primary age cohort was strong enough to influence a significant relationship for the entire group, although no significance was demonstrated for the preschool or middle cohorts by themselves. The middle grade cohort, according to regression analyses on Peabody scores, was somewhat unique in that nothing besides pretest level contributed significantly to explaining variance on gain. The failure of the independent variable clusters to explain gain for this oldest group of language disordered children was underscored by comparing the R^2 added for each of the three age cohorts. The total amount of variance explained by research factors for the middle grade cohort was approximately 10 percent, whereas 14 percent was explained for primary grade youngsters, and 21 percent was explained for preschoolers. It was apparent that the older the student, the more pretest level accounted for ultimate gain on the Peabody test, and the less explanatory power was provided by the independent variable clusters.

In summary, analysis of the P.P.V.T. by age cohort suggests that some interesting specific interaction effects may be masked by including all students, regardless of age, in analyses. For the Peabody test, at least, less than 10 percent of gain could be explained for the middle grade age cohort. Almost 22 percent of gain in preschool children was accounted for: the majority of this appears attributable to I.Q.

In general, the primary level age cohort (the largest) influenced the overall analyses most. More of the research factor clusters contributed significantly to explaining variance on pretest level and gain for this group than to either of the others. Insofar as the P.P.V.T. is representative of other language functions, analyses using the total range of predictor variables in this study have been most sensitive to explaining relative language level and language change for communicatively handicapped children between 6-0 and 8-11 years of age.

CHAPTER V

DISCUSSION

The study reported here has utilized a large data archive on over 700 language disordered children to address several broad issues concerning this population of handicapped youngsters. First, organization of the archive allowed a more complete description of these children than has previously been possible--more complete both from the standpoint of numbers of children and range of variables available for study. These descriptive data, organized as demographic/background, physical/developmental, social/personality and performance characteristics, have been presented in some detail. Specific findings will be discussed later in this section in relationship to several issues of theoretical interest concerning the nature of language handicaps and potential causal factors. The archive is now preserved on magnetic tape and is available to interested researchers.

A second purpose to which these study data may be put is somewhat more pragmatic in nature. As was pointed out in the first chapter, recent federal legislation has mandated appropriate public education for all handicapped children. The resulting economic considerations have placed a premium on information which can help policymakers decide where costly special education programs can be streamlined without sacrificing quality (see AERA Generator, "Prospects and Problems of the Education For All Handicapped Children Act (PL94-142)" particularly articles by Davis and Shankar, in press). Several outcomes of the current study have potential policy implications in this regard. Additionally, the major study analysis of factors contributing to gain in language performance provides some interesting and thought-provoking information regarding characteristics of children who make the most gain in language performance versus those who progress least during two to three years in a language disorders program.

Let us set the stage for discussion of specific theoretical and policy issues by reviewing the major analyses of the study, e.g., the ability of various clusters of intuitively related variables to account for a) variation in language performance at the time of program entry and b) variation in the amount of language gain measured over a two to three year period in the program.

Table 30 presents a summary of these results (taken from Tables 21-27) for the four variable clusters which can be considered "causal" in nature.[1] The first, and

[1] The variables included in the Language History and Program Status clusters were largely circular in nature and the significant results from these clusters primarily served to validate parental judgments of the child's language performance and the program staff's placement decisions.

Table 30: Percentage of Non Age-Related Variance Accounted for by Four Causal Variable Clusters

	Pretest Level		Gain	
	Individual	Conjoint	Individual	Conjoint
I.Q.	4.5%**	4.5%**	3.6%**	3.6%**
S.E.S.	1.2%	1.4%	0.6%	0.7%
Physical	11.3%**	10.5%**	4.1%	1.1%
Social Emtl.	4.8%	3.8%	6.4%*	6.0%*
Total	(21.8%)	19.7%	(14.7%)	11.4%

* $p < .05$

** $p < .01$

perhaps most striking, result shown by Table 30 is the uniformly low percentage of total non age-related variance accounted for by the clusters of variables. Roughly a fifth of this non-age variance in pretest level is explained by the four clusters, while only 11 percent of the variation in improvement can be similarly explained. There is no escaping the conclusion that the factors in the study failed to account very well for either the language performance of these children at the time of program entry (more than 75% of this variance is attributable to unknown factors) or for the language gains made by program children (almost 90% of this variance must be explained through other sources). As in earlier investigations, this study found it difficult to identify general factors which influenced language performance or language progress for language disordered children as a group.

A comparison of the total percentages of variance accounted for by the four clusters individually (regressed against the language measure on an independent cluster-by-cluster basis) versus in conjoint analysis (hierarchical regression procedures in a consistent specified order) suggests that these factors are largely independent of one another. There is relatively little predictive power lost when the clusters are considered conjointly, where the effect of each cluster represents only the contribution made over and above that provided by previous clusters. The difference between these totals is approximately 2 percent for Pretest Level, slightly over 3 percent for Gain. There is some age caused overlap, but in general these four factors appear to operate fairly independently. This independence is interesting and raises the possibility of identifying distinct categories of language disordered children across the dimensions of I.Q., socioeconomic status, physical background factors, and social-emotional/ personality characteristics. If groups of language disordered children who vary across these dimensions can be identified and if they exhibit distinct language profiles, such categorization would have potential diagnostic and remedial importance. Such a procedure utilizing the current archive would be a recommended follow up of this study.

Table 30 also provides a summary overview of the relative significance of the four clusters of predictor variables in the two separate regression procedures. Having just emphasized the small magnitude of overall variance explained by factors studied, it is nevertheless interesting to examine the relationships among the various clusters and to consider their relative contributions as predictor variables. In predictions of pretest language performance, I.Q. and physical background factors played the strongest role. The failure of socioeconomic status and social-emotional variables to contribute significantly is of particular interest. Socioeconomic status variables are usually very strong predictors of performance (and gain) in language and educational research with normal children.

The fact that this was not the case in this study reinforces the contention that the language disability of the children in this program was not a function of environmental "disadvantage": indeed, the children showed pervasive problems which were unrelated to family background characteristics such as parents' education, occupation and cultural/ethnic ties. The lack of significance contributed by social-emotional/personality variables appears to indicate that variations in the social-emotional status among program children did not have much to do with their levels of language performance at program entry, i.e., their language difficulties were probably coming from elsewhere.

The pattern of significance changes somewhat when relative improvement in language is being predicted. The failure of socioeconomic status variables in this regard continues to be noteworthy. I.Q., while making a statistically significant contribution, is remarkable for its low absolute value. By program guidelines, these children should have language problems uncorrelated with I.Q., and, with age removed, pretest analysis shows this to be by and large true.

However, it seems likely that smarter children will progress faster, will respond more to remediation efforts. Thus I.Q. should load well on the gain analysis and less well on prediction of pretest level. As Table 30 points out, this was not the case. Though contributing significantly in both instances, the effect was not very large in either, and the proportion of residual variance explained was even less for gain than for pretest level. I.Q., at least as indexed by performance measures such as the Leiter and the WISC Performance Scale, was a surprisingly poor predictor of future progress in language development for these children. This finding raises questions that echo those suggested recently in the literature (Johnston, in press; Bannatyne, 1974; Valtin, 1978-79): What is the nature of the tasks incorporated in performance scales vis à vis developmental changes in cognitive ability? How appropriate are such measures for establishing "normal potential" in language handicapped children?

Two clusters of variables showed reversals in the significance their contributions made to pretest level as opposed to gain. The Physical cluster was a predictor of pretest level but not of improvement, suggesting perhaps that its effects are rather coarse--physical/neurological background factors contribute to the overall level of language performance for program children but do not have much effect on any incremental progress made from there. The effects of the Social-Emotional cluster went the other way--although this cluster did not appear to have much to do with the overall language level of program children, it did predict gain. This suggests that while emotional factors may not have a direct relationship to language disordered children's original problem, such factors do influence the way these children interact with parents, teachers and peers to the extent that it affects their learning ability (improvement on language measures).

Information Relating to Theoretical Issues

How then does the information gained from this study relate to some of the issues and questions raised in the literature and reviewed in the first chapter? Although no direct hypotheses were tested, the current findings do add some general information bearing on at least three theoretical issues: (1) the nature of language disorders in school aged children, (2) the relative importance that some proposed "causal" factors play in the histories of these children and (3) the pattern of language acquisition in this population, e.g., how language disordered children appear to be acquiring language competencies. The large sample size and the wide range of variables examined are particularly helpful in drawing some general conclusions.

The Nature of Developmental Language Disorders in Children

As Weiner pointed out in his review, there is little agreement concerning the nature of children's non-specific developmental language disorders beyond the fact that they do exist. A relatively unitary concept of the disorder is implied in studies based on cognitive or semantic assumptions about the nature of language, generally represented by work based on a Piagetian framework (deAjuriaguerra, 1958, 1965; Sinclair-de Zwart, 1973; Inhelder, 1976; Schmid-Kitsikis, 1973). These authors consider language impairment to be a reflection of a child's underlying thought or ability to manipulate symbols. In contrast, many clinical procedures and training approaches are based on the assumption that psycholinguistic abilities are plural--and separable (Myklebust and Johnson, 1967; Kirk, 1971; Wiig-Semel, 1976). The most common distinction made is between receptive and expressive language abilities. The relationship of articulation problems and reading difficulties to language disorders is also an issue (Weiner, in press).

This study provided additional evidence for the existence of a category of children with language difficulties that are basically unrelated to I.Q., socioeconomic status and cultural/ethnic backgrounds. Although all children in the study were selected on the basis of a discrepancy between language performance and nonverbal abilities, there was no evidence that the percentage of children from bilingual environments was greater than expected based on the population in Los Angeles County as a whole. The socioeconomic status of program families showed an essentially normal distribution. Assertions that the poor language performances of these children are a result of environmental factors such as little or no exposure to stimulating materials and activities or, alternately, due to a lack of exposure to English are unsupported. In general this group of children had I.Q. scores in the low normal range when measured nonverbally. Yet this nonverbal I.Q. gave surprisingly little information about the child's relative language performance (less than 2 percent of non-age related variance was explained on the pretest level). From a descriptive standpoint, the language disability of the 718 children in this study--a disability which was severe enough to necessitate at least two years of special education--did seem to exist independent of the cognitive and environmental factors commonly associated with language delay.

However, evidence for any distinctly different patterns of language functioning was not clear cut. The fourteen separate language-related measures included in the diagnostic battery had been chosen by program staff to represent various aspects of language functioning--expressive versus receptive abilities, auditory versus visual abilities, attention and memory factors versus underlying conceptual knowledge, etc. The high intercorrelation among all these separate scores (see Appendix VI) and the factor loadings on a single factor (see Table 5) suggest that the array of tests was not providing the information necessary to distinguish groups of children on the bases of their performance on these measures. There are, of course, problems in designing measurement procedures to tap specific modalities or language processes. These tests may not have represented "pure" enough measures of any of these domains. However, there is also the possibility that theoretical receptive/expressive, visual/auditory or memory/content distinctions provide relatively limited information for distinguishing groups of language disordered children. Rather, a general, underlying (and somehow more pervasive) disability may characterize the difficulties these children experience in learning language.

A few additional findings from the descriptive information on language disordered children assembled in the course of this study should be highlighted. Weiner has pointed out the need for information on early language development, speech production abilities, and academic performance of language disordered children. The children in the current study had histories of a marked delay in onset of speech (with first words at $\bar{x}=21.3$ months). Additionally, there was a protracted single word stage ($\bar{x}=16.3$ months with two-word sentences at $\bar{x}=37.6$ months) which was significantly longer for boys than for girls ($t=2.20$, $df=335$, $p < .05$). At time of program admission, 23.1 percent of the children displayed normal articulation abilities. Oral motor difficulties were either apparent or suspected for 46.1 percent, and 8.4 percent exhibited stuttering or voice problems. Therefore, over three quarters of the study children experienced some difficulty with speech sound production, and almost half of them had suspected difficulty with control of the oral mechanism.

Academic abilities were uniformly delayed for these children. At the time of program admission the average child was almost two years behind in reading and spelling, although less than one year delayed in mathematics. However, such grade level scores for the total group are somewhat misleading since academic tests were inappropriate for children below six years of age and many of them were assigned "age appropriate" grade scores based on a minimal response. The age cohort summary in Table 12 shows that the academic lag became exaggerated as these children grew older. The average primary level student was 7.23 years of age and performed at just below the first grade level (almost two years' delay) while the average middle grade student was 11.21 years old and performed academic tasks at a beginning second grade level (approximately four years delayed). When children entered the program, mathematics scores were slightly higher than reading and spelling, although this ability did not approach an age-appropriate performance.

Table 31 shows the average gain in performance on the Wide Range Achievement Test for children in each of the three age cohorts who received both pre- and posttest scores on this measure. The greatest gain was made for all three cohorts on math scores as compared with reading and spelling, yet even in this area of relative strength, progress did not match the corresponding time interval (1 year 1 month to 1 year 10 months' growth in 2 years 5 months time). Growth in reading and spelling for the same time period averaged 1 year. The largest proportional gain in all areas was made by the preschool cohort. Part of this apparently more rapid gain for preschool children is undoubtedly an artifact of the inappropriateness of academic tests for three and four year olds. Some preschool children were assigned hypothetical academic levels at program entry consistent with age and based on minimal response. Two to three years later they took the assessments with the benefit of formal preschool training, something the majority of children in the norming population had not received. However, the overall trend remains obvious; the younger age cohorts made more rapid academic progress as measured on the Wide Range Achievement Test. Adolescent language disordered students did show academic growth but at a reduced rate, consistent with earlier findings that these children continue to fall further and further behind as they move into early adulthood.

Table 31: Mean Gain on W.R.A.T. for Age Cohorts of Language Disordered Children

	Pretest		Posttest		Gain[a]	
N	Raw Score	Grade	Raw Score	Grade	Raw Score	Grade
Reading 540						
Preschl. (138)	11.3	K.2	29.7	1.4	18.4	1yr 2mo
Primary (266)	21.6	K.9	37.8	1.9	16.2	1yr 0mo
Middle + (136)	36.5	1.9	48.2	2.7	11.7	10mo
Mathematics 431						
Preschl. (117)	7.4	PK.8	18.9	1.6	11.5	1yr 10mo
Primary (213)	14.6	K.7	23.5	2.4	8.9	1yr 7mo
Middle + (101)	22.9	2.2	28.2	3.3	5.3	1yr 1mo
Spelling 404						
Preschl. (108)	8.9	K.1	21.9	1.4	13.0	1yr 3mo
Primary (200)	16.9	K.9	26.2	1.9	9.3	1yr 0mo
Middle + (96)	25.8	1.8	31.8	2.7	6.0	11mo

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[a] $\bar{x}$ interval between pre and posttests = 2 yrs. 5 mo.

Causal Factors--Social-Emotional versus Physical

The primary analysis of this study, summarized in Table 30 and reviewed earlier in this section, presents evidence suggesting a somewhat differential role for social-emotional factors versus physical/neurological factors in explaining the language performance of language disordered children. Physical factors appear to have a significant relationship to initial language level, whether considered alone or conjointly with other clusters of predictor variables. In other words, those children with medical/developmental histories suggestive of brain damage and neurological involvement performed significantly lower on language tests at admission to the program than did children of the same age, I.Q. and socioeconomic background without such histories of physical involvement.[2] In contrast, the social-emotional and personality factors examined in this study did not predict language performance at program entry. This suggests that variation in the social-emotional status of these children had relatively little to do with their language ability at the time of pretest.

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[2] Curiously, the single variable included in the physical cluster which would seem a most direct expression of physical/neurological status at program entry (written medical diagnosis of neurological impairment), did not contribute to explaining pretest level variance, yet was predictive of relative gain. This suggests that a physician's ability to judge the neurological status af time of program entry has more prognostic significance than early medical history.

When the relative contribution of the sets of social-emotional and physical variables to the prediction of language improvement was compared, an interesting reversal took place. The set of physical variables appeared to have little to do with incremental language gain measured over a two to three year time span, whereas social-emotional and personality variables did contribute significantly to predicting such gain. For the language deficient children in this study at least, a history of physical/neurological problems at birth was related to an initially lower level of language functioning. Social-emotional and personality characteristics of the children were related to faster progress in language over a two to three year period. This suggests the hypothesis that, although social-emotional factors did not cause these children's language problems, they did get in the way of remediating it.

Since the social-emotional and physical factors did seem to operate fairly independently from one another, it might be useful to pursue this physical/emotional dichotomy in future research. If language performance patterns prove to be significantly different for groups of program children rated either high or low along these two dimensions, perhaps the relative causal influence of these factors can begin to be disaggregated and examined more closely. Byrne, et al.'s (1974) hypothesis that the most severely impaired language disordered children have a high incidence of physical/neurological problems in their backgrounds while moderately impaired children are more likely to have a high incidence of familial language disorders can be tested using data from the archive.

The Pattern of Language Acquisition for Language Disordered Children

One of the issues which has been recurrent in studies of how language disordered children acquire language is whether the process approximates the sequence of development in normal children or is unique (the "delayed versus different" controversy). The literature reviewed in Chapter I suggested that the bulk of evidence currently points to the normal although delayed position. Information in the current study is consistent with this interpretation. In the regressions on pretest level, age was the best predictor of language performance (see Tables 13-19). Although language development for this group of children was generally slowed and impaired, still the older children did better, the young not so well. This supports the notion of sequential delays and a somewhat uniform slowing as opposed to severe disturbances that completely violate a normal progression. The high zero-order pretest-posttest correlation (r=.68) further indicates that there was considerable continuity in the language performance of these children. There was no evidence of capricious gains being made by some children while great losses occurred for others. Rather, those children who started high on language measures by and large continued to perform well when retested; those children who were originally low stayed low.

Information Relating to Program and Policy Issues

Results of this study have application to some of the policy issues alluded to in the second section of Chapter I, Educational Programming for Children with Language Disorders. As a result of the recent federally-legislated mandate to serve handicapped children with a "free appropriate public education" designed to meet individual children's needs (PL 94-142) there is increasing political pressure to expand costly special education services. Simultaneously there is a nationwide realization of the necessity for fiscal restraint. Information assembled during the current research bears on at least three policy issues: (1) The general program model examined: what kinds of children are being served? Which children leave the program and where is the subsequent educational placement? (2) Ways of streamlining time consuming diagnostic procedures and recordkeeping: what information should we collect on these children? What assessment instruments provide the most useful information for charting growth and development? And (3) Characteristics of the children who make the most gain in the program: are there particular characteristics of language disordered children that will allow us to predict which ones will improve most in an intensive special day class program?

Validity of the Program Model

Much of the descriptive information presented in the earlier discussion section, The Nature of Developmental Language Disorders in Children, has applicability to consideration of the program model. The program was designed to serve children who tested in the normal range on nonverbal intelligence measures and who had, in comparison to this ability, severe difficulty in understanding and/or using language processes. This language deficit was presumed to be related to physiological/neurological difficulties and was not to be attributable to hearing loss, a severe emotional disorder, or evidence of a bilingual background. Summary statistics (Tables 9-12) confirm that subjects in the program did, in fact, meet these criteria.

The regression analyses (summarized in Table 30) give further evidence that the language disability of these children was independent of socioeconomic status and bilingual background. A medical diagnosis of neurological dysfunction was noted in medical records of only about 30 percent of the children; yet a set of variables indicating physical/neurological problems was significant in predicting level of language functioning at the time the children entered the program. Conversely, social-emotional variables did not predict language ability. It appears, then, that the children enrolled in this program for at least two years did indeed display the patterns of language disability specified in the regulations of the California Education Code, Title V (Appendix II).

The set of variables included in the Program Status cluster (see Table 6) did not apply as a predictor of language level since the majority of these variables related to ultimate disposition of children who had left the program (N= 396) or to the length of program enrollment if the child was still enrolled as of January 1, 1979 (N=322). However, the highly significant contribution these variables made to regression equations predicting language level and gain did offer some validation of program management decisions: children with higher initial language levels and children who made the most improvement during the two to three year study period were more likely to return to "less restrictive" educational environments (including normal class placement, normal class with speech help, or normal class with special resource teacher help). Program staff was clearly returning those children with the best language abilities and those who had made the most rapid progress to their local school districts. The percentage of children which returned is shown in Table 32. It must be remembered that this represents only those children whose language disorder was severe enough to require at least two years of program enrollment. There were also some children admitted who had marginally qualifying deficits and/or who made such rapid progress that they were returned to district placements in less than two

Table 32: Disposition of Children

Leaving Program

Left Program as of 1/1/79		Percent
Yes:	396	55.2
No:	322	44.8

Reason for Termination: (N=396)

	N	Percent
Language Age Adequate =	200	50.5
Successful Integration/Qualifies =	13	3.3
Graduated =	12	3.0
Moved =	81	20.4
Withdrew (Parents or Child) =	34	8.6
Lack of Progress/Low I.Q. =	31	7.9
Severe Emotional/Behavior Problem =	23	5.8
Hospitalized =	2	.5

Recommended Subsequent Placement (N=263)

	N	Percent
Regular Class	58	21.9
Regular Class Plus Speech Therapy	64	24.2
Tutorial/Learning Disabilities Group	40	15.1
Educationally Handicapped Class	54	20.4
Educable Mentally Retarded Class	24	9.1
Deaf/Hard of Hearing Class	6	2.3
Orthopedically Handicapped Class	5	1.9
Autism Class	5	1.9
Other (Private School/ Hospital Diagnostic Unit)	9	3.4

years' time. These children have not been included in the current study. The reasons for termination from the program, shown in Table 32, indicate that 23 percent left the program either by graduating (3%) or moving (20%). Two children were hospitalized and thirty-four children (8.6%) were withdrawn by parents or the child itself. The remaining 265 language disordered students who left the program were recommended for alternate placements. About 54 percent of all children leaving the program did so because language was age adequate or, despite some continuing measurable language deficiency, the child had demonstrated through integration activities the ability to cope successfully in a regular school setting. Approximately 14 percent of children placed in alternate settings were because of lack of progress (7.9%) or severe emotional or behavioral difficulties (5.8%).

The last breakdown in Table 32 indicates the recommended subsequent placement for these children. Approximately 22 percent returned to regular classes, and 24 percent to regular classes with speech therapy. A sizeable group of children were thought to need additional support in the form of tutorial groupings for one or two hours a day in addition to regular class placement. Approximately a fifth of the language disordered children were recommended for continued special academic help in small classes of twelve to fifteen students at their local schools (Educationally

Handicapped).[3] The remaining children (18.6%) were suggested for other, more restrictive special education classes to meet additional emotional, physical and educational needs.

Streamlining Diagnostic and Information Gathering Procedures

Diagnostic evaluations for documenting disorders of language have traditionally incorporated a wide range of procedures and instruments and have been quite time consuming (two to four hours for administration, plus additional staff time for scoring, interpretation and writing up results). Such procedures were utilized in the program under study and resulted in pretest-posttest scores for 718 language disordered children on fourteen separate language measures. The procurement of this data alone represented (conservatively) 2,500 hours of staff time, exclusive of any time spent in staffings and parent conferences to interpret and discuss the findings. Such an investment of professional time is certainly warranted if information is obtained which will help define educational placements and program options. However, findings of this study suggest that much of the information included in the various language measures is highly redundent. Table 5 (p. 42), shows the factor loadings for each of the fourteen individual language measures on the first principal factor, a general language ability. Overall, each of the measures loaded substantially and positively with the general factor. At the time of pretest administration, the ratings of oral motor and articulatory ability loaded slightly less (.40 and .51 respectively). Reading scores (.68) and the I.T.P.A. Visual Memory subtest (.69) were the next most discrepant. The rest of the measures loaded .74 or better with the general principal factor--the Peabody (.85), Auditory Association (.89), Verbal Expression (.84), Grammatic Closure (.89) and N.S.S.T. Expressive (.84) showed an especially high degree of overlap (see also Intercorrelation Matrix, Appendix V). At time of posttest administration, a remarkably similar pattern of factor loadings was evident. The only significant change occurred in reading grade score, which dropped to .30. Auditory and Visual Memory also loaded slightly less at posttest (.65 and .53). There is no evidence of a clear distinction between receptive and expressive language measures, nor between tests that look predominantly at the structure of language (syntax and morphology) versus lexical meaning (vocabulary). The results of this study, then, suggest that the language related measures which would provide the most distinct information would be:

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[3] While recommendations for EH and LDG placements were made by a committee including personnel from the home school district as well as parents and language disorders program staff, openings in such classes at local districts varied and undoubtedly these recommendations were not always carried out. In 1977, a small follow-up study of children who had returned to local district placements indicated that of 40 children, six (or 12.5%) had not been placed in the subsequent educational settings recommended but instead had gone into regular classes. Interestingly, only one child had "failed" and needed to be returned to a language disorders class, although teachers reported that the other children were having difficulty and three of them were scheduled for additional help the following year.

Assessment Area	Examples in Current Study
General language ability	P.P.V.T. Aud. Reception-I.T.P.A. Aud. Assoc.-I.T.P.A. Verb. Expression-I.T.P.A. N.S.S.T.-Receptive & Expressive Elicited Imitation MUL
Speech production ability	Articulation Oral Motor Ability
Reading	Reading grade level scores
Memory for Non-Language stimuli	Auditory Memory-I.T.P.A. Visual Memory-I.T.P.A.

Streamlining a test battery along these lines should result in considerable savings in staff time with minimal loss in information. Assessments of general language ability, speech production, reading and memory skills should be the least redundant. Indeed, the individual analyses using the Peabody test reading scores and articulation ratings reported in the last section of Chapter IV, Results, demonstrate that somewhat different information is obtained from each of these three measures.

Two additional issues pertaining to diagnostic procedures have been raised during the course of this study. First, there is evidence of a sex difference in the severity of the language disability of children entering the program, with girls showing significantly lower scores on some language tests as compared with boys of the same age and I.Q. Because proportionately even fewer girls are referred to the program than are accepted, this suggests that a sex bias was operating at the time of referral. Perhaps teachers are more tolerant of poor language performance for girls. Perhaps parents are less willing to allow their daughters to be considered for placement in a special school. However, it would be advisable to review some randomly selected program admissions and rejections to assure that some boys were admitted to the program would not have been denied such service if they had been girls.

The second issue concerns the appropriateness of the instruments used in describing these children's language and cognitive abilities. This issue is not a new one and is certainly not unique to the language disordered population. The search for assessment tools appropriate to any "different" group--whether culturally, behaviorally or developmentally different--has been arduous and fraught with controversy. In the present study there is indication that the language assessment procedures are most sensitive to and most appropriate for those language disordered children aged 6-0 to 8-11 (see discussion of age cohort analysis in Results section, p. 54). The fact that most language measurement instruments are tested and standardized most thoroughly on children in this age range is part of the reason. The fact that children below six years of age, particularly children with language delays, are less reliable test takers and are less likely to sit and cooperate for formal evaluation procedures is another factor. The "ceiling effect" of many oral language processes at around eight to ten years (the age by which normal children have developed essentially adult competency) complicates assessment of youngsters in their teens. All of these considerations highlight the need for caution in interpreting language performance and language gain across different age cohorts; we are probably on safest ground with children in the elementary grade years so long as we continue to use the language measures included in this study (and that means virtually all that are currently available).

An additional assessment concern that has been alluded to at least once during this study is the appropriateness of measures of nonverbal cognitive ability. The two instruments used in this study, the Leiter International Performance Scale and the Wechsler Intelligence Scale for Children-Revised Edition, Performance Scale, did not always seem to give comparable results (see footnote, p. 43). There is some evidence that Leiter scores decline as language disordered children get older. Does this mean that the skills tapped by this instrument are so age-loaded that the test does not provide a realistic estimate of future potential for young language disordered children? Broader questions concerning the role that various perceptual and symbolic processes play in cognitive development come to mind at this point. Perhaps examination of language disordered children's relative linguistic and cognitive development can shed some light on these issues. However, in order to provide standardized information on a full range of verbal and nonverbal cognitive tasks as well as to estimate nonverbal cognitive potential, it seems that the W.I.S.C.-R scale (both Verbal and Performance scales) would be the instrument of choice wherever possible.[4]

This would allow comparative analyses of subtest score patterns with several special populations already in the literature (Bannatyne, 1974; Smith, et al., 1977; Wallbrown, et al., 1974).

In addition to streamlining diagnostic procedures, the choice of background information to collect and record at the time of program referral could be more efficient. Many of the files for program children contained voluminous records from previous agencies and schools as well as from parent interviews and questionnaires. Often much of this information was inaccessible because there was no uniform reporting format. Through systematic organization and scrutiny of data in the archives, this study has identified the variables (from those that were commonly available) which provided the most information for distinguishing the language performances of the children at pretest or the relative improvement they made over a two to three year period. Table 33 summarizes these results.

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[4] The WISC-R is not standardized for children below six years of age. The lower extension, the WPPSI (Wechsler Preschool and Primary Scale of Intelligence), is standardized on 4-6 year olds. The choice of an appropriate instrument for preschool children remains a problem. It seems judicious, however, for psychologists and professional staff working with very young language disordered children to be cautious in interpreting scores from scales stressing visual motor performance as predictive of future cognitive performance.

The variables which best predicted relative language performance at the time of program entry are listed under Pretest Level; those that contributed most to explaining relative gain between pre- and posttests are listed under Improvement. The third column, Active Variables, is a composite of the first two categories and constitutes a listing of those variables suggested by the current study as most likely to be important in future research with language disordered children. A standard form which minimally lists these characteristics of program children would simplify recordkeeping procedures immeasurably and would capture the vast majority of the information currently available in program files which distinguished language disordered children's relative performances. The fact remains, however, that all of the identified factors considered together did not predict relative levels of performance or relative gain over time very well for program children. All the more reason not to spend time and effort collecting such detailed background data. The last column in Table 33 lists variables which consistently contributed almost nothing to the

Table 33: Key Study Variables for Future Research

Domain	Pretest Level	Improvement	Active Variables	Least Active/ Contributed Little
Cognitive	NonVerbal I.Q.	NonVerbal I.Q.	Nonverbal I.Q. (suggest using WISC-R, both Performance and Verbal Scales for future comparisons)	
Socio-Economic Status	Father's Occupation	Mother's Level of Education	Education and Occupation Levels of Parents	# Siblings, Type of Residence, Bilingual Environment
Physical	Degree of Hearing Loss, Mother's Age at Birth, Age of Walking, # Accidents, Birth Complications, # Special Tests, Medication for Behavior/Neurological Control	Medical/Dx of Neurological Disorder, Degree of Hearing Loss, Maternal Illness, # Special Tests, # Health Providers, Birth Complications	Degree of Hearing Loss, Birth Complications, # Special Tests (EEG, Spinal, etc.), Medical Dx of Neurological Disorder, Maternal Illness, Age at Birth # Accidents, # Health Providers, Medication for Behavioral/Neurological Control, Age Child Walked	Sleeping Difficulties, # Hospitalizations, Visual Impairment, Childhood Illnesses, Clumsiness, Feeding Difficulties
Language History	Parents' Judgment of: Current Language Use, Use of Gestures, Clarity of Speech, Recent Improvement in Articulation; Age of 1st Word	Abnormal Crying, Articulation Ability, Attention of Infant to Caregiver, Use of Gestures	Parental Judgments of: Articulation Ability, Use of Gestures, Current Level of Language Use, Abnormal Crying in Infancy, Attention to Caregiver in Infancy, Age of 1st Word, Recent Articulation Improvement	Parents' Judgment of: Child's Ability to Hear Sounds/Speech, Early Imitation of Speech, Age When Child First Used Words Appropriately
Social Emotional	Rating of Behavioral Maladjustment, Enrolled in Counseling/Therapy, Method of Discipline	Parent Reports as Significant Behavior Problem, Preference for Isolated Play Activities, Pleases Parent- # Positive Comments Volunteered, Method of Discipline	Described by Parent as Behavioral Problem, # Positive Comments Volunteered by Parent, # Indicators of Behavioral Maladjustment (check list), Method of Discipline in Home, Enrolled in Counseling/Therapy, Preference for Isolated Play Activities	Marital Status-Intact Home, Birth Order
Program Status	Recommendation for Subsequent Placement	Recommendation for Subsequent Placement, Length of Time in Program, Reason for Discharge	Recommendation for Subsequent Placement, Reason for Discharge, Length of Enrollment in Program	# Moves Prior to Enrollment, # Moves Within the Program

analyses. Such items might well be the first ones deleted from forms and questionnaires as procedures are streamlined. Other variables considered in the analysis (see Table 6) which do not appear in this summary chart made very small positive contributions in the regression analyses and probably have little likelihood of yielding much additional information.

The Children Who Improve Most

The regression of all research factors in the prediction of gain (Table 27) indicates that Age contributes significantly over and above the effects of pretest level. Although the absolute contribution to explained variance is small (R^2 added of 2.5%), it is nevertheless larger than any other single "causal" variable. This age loading shows that the flexibility of immaturity is some advantage: at the same pretest level, younger children will improve more after two to three years in the program. And what are other characteristics of these children which might suggest how long a remedial treatment program is indicated? What are the factors in a case history that will allow a teacher concerned with instructional grouping to identify a child who will progress rapidly in contrast to one whose language skills will improve slowly? A list can be constructed using Table 33. The progress over two to three years of a language-disordered child of a given pretest language level will be more rapid:

- the younger the child
- the higher the nonverbal I.Q.
- the more education the mother has
- the less hearing loss the child displays
- the fewer different doctors/clinics he/she has visited
- the more "communication oriented" and responsive the child was as an infant (indexed by parental report of attentiveness, use of gesture, frequency of crying)
- the clearer he/she speaks currently
- the fewer behavioral problems are reported
- the more positive things a parent has to say about the child
- the less physical methods of discipline have been used at home
- the fewer isolated play activities are preferred by the child in contrast to social activities.

This list is not, of course, meant to imply that children with such characteristics should be offered remedial programs preferentially. There are many bases upon which decisions for inclusion in a service program are made besides relative improvement. Relative need suggests that programs should be modified or developed to serve language disordered children who meet the above criteria least.

In summary, this study has organized a large data archive gathered on more than 700 children with language disorders over eight years. Sets of descriptor variables in six domains were identified from program records and were used to predict language performance at program entry and relative language improvement over two to three years. The resulting descriptive and analytic data have been discussed in terms of several theoretical issues concerning this group of children and how they acquire language. Additional program information has been presented which bears upon policy issues such as validity of the program model, and streamlining of diagnostic and data keeping procedures. Characteristics of those children who progressed most in this program have been identified. This study has attempted to provide a broad overview of language disordered children. Areas of potential interest for further, more detailed investigation have been suggested. Fortunately the archive is now preserved on magnetic tape and is available for further analysis by interested researchers. In this sense the children who have been a part of this program, who have shared their life histories and their important educational years with us, will have left a permanent communication.

"I know that is, I just can't say it"--Mike, age 12.

"...an 'dis end. Aw done now."--Ann, age 5.

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Public Law 94-142
94th Congress, S. 6
November 29, 1975

An Act

To amend the Education of the Handicapped Act to provide educational assistance to all handicapped children, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Education for All Handicapped Children Act of 1975".

Education for All Handicapped Children Act of 1975.
20 USC 1401 note.

EXTENSION OF EXISTING LAW

SEC. 2. (a)(1)(A) Section 611(b)(2) of the Education of the Handicapped Act (20 U.S.C. 1411(b)(2)) (hereinafter in this Act referred to as the "Act"), as in effect during the fiscal years 1976 and 1977, is amended by striking out "the Commonwealth of Puerto Rico,".

(B) Section 611(c)(1) of the Act (20 U.S.C. 1411(c)(1)), as in effect during the fiscal years 1976 and 1977, is amended by striking out "the Commonwealth of Puerto Rico,".

(2) Section 611(c)(2) of the Act (20 U.S.C. 1411(c)(2)), as in effect during the fiscal years 1976 and 1977, is amended by striking out "year ending June 30, 1975" and inserting in lieu thereof the following: "years ending June 30, 1975, and 1976, and for the fiscal year ending September 30, 1977", and by striking out "2 per centum" each place it appears therein and inserting in lieu thereof "1 per centum".

(3) Section 611(d) of the Act (20 U.S.C. 1411(d)), as in effect during the fiscal years 1976 and 1977, is amended by striking out "year ending June 30, 1975" and inserting in lieu thereof the following: "years ending June 30, 1975, and 1976, and for the fiscal year ending September 30, 1977".

(4) Section 612(a) of the Act (20 U.S.C. 1412(a)), as in effect during the fiscal years 1976 and 1977, is amended—

(A) by striking out "year ending June 30, 1975" and inserting in lieu thereof "years ending June 30, 1975, and 1976, for the period beginning July 1, 1976, and ending September 30, 1976, and for the fiscal year ending September 30, 1977"; and

(B) by striking out "fiscal year 1974" and inserting in lieu thereof "preceding fiscal year".

(b)(1) Section 614(a) of the Education Amendments of 1974 (Public Law 93-380; 88 Stat. 580) is amended by striking out "fiscal year 1975" and inserting in lieu thereof the following: "the fiscal years ending June 30, 1975, and 1976, for the period beginning July 1, 1976, and ending September 30, 1976, and for the fiscal year ending September 30, 1977.".

20 USC 1411 note.

(2) Section 614(b) of the Education Amendments of 1974 (Public Law 93-380; 88 Stat. 580) is amended by striking out "fiscal year 1974" and inserting in lieu thereof the following: "the fiscal years ending June 30, 1975, and 1976, for the period beginning July 1, 1976, and ending September 30, 1976, and for the fiscal year ending September 30, 1977,".

20 USC 1411 note.

20 USC 1413 note. (3) Section 614(c) of the Education Amendments of 1974 (Public Law 93-380; 88 Stat. 580) is amended by striking out "fiscal year 1974" and inserting in lieu thereof the following: "the fiscal years ending June 30, 1975, and 1976, for the period beginning July 1, 1976, and ending September 30, 1976, and for the fiscal year ending September 30, 1977,".

Ante, p. 773. (c) Section 612(a) of the Act, as in effect during the fiscal years 1976 and 1977, and as amended by subsection (a)(4), is amended by inserting immediately before the period at the end thereof the following: ", or $300,000, whichever is greater".

20 USC 1412. (d) Section 612 of the Act (20 U.S.C. 1411), as in effect during the fiscal years 1976 and 1977, is amended by adding at the end thereof the following new subsection:

Publication in Federal Register. "(d) The Commissioner shall, no later than one hundred twenty days after the date of the enactment of the Education for All Handicapped Children Act of 1975, prescribe and publish in the Federal Register such rules as he considers necessary to carry out the provisions of this section and section 611.".

Ante, p. 773. 20 USC 1411 note. (e) Notwithstanding the provisions of section 611 of the Act, as in effect during the fiscal years 1976 and 1977, there are authorized to be appropriated $100,000,000 for the fiscal year 1976, such sums as may be necessary for the period beginning July 1, 1976, and ending September 30, 1976, and $200,000,000 for the fiscal year 1977, to carry out the provisions of part B of the Act, as in effect during such fiscal years.

STATEMENT OF FINDINGS AND PURPOSE

20 USC 1401 note. SEC. 3. (a) Section 601 of the Act (20 U.S.C. 1401) is amended by inserting "(a)" immediately before "This title" and by adding at the end thereof the following new subsections:

"(b) The Congress finds that—

"(1) there are more than eight million handicapped children in the United States today;

"(2) the special educational needs of such children are not being fully met;

"(3) more than half of the handicapped children in the United States do not receive appropriate educational services which would enable them to have full equality of opportunity;

"(4) one million of the handicapped children in the United States are excluded entirely from the public school system and will not go through the educational process with their peers;

"(5) there are many handicapped children throughout the United States participating in regular school programs whose handicaps prevent them from having a successful educational experience because their handicaps are undetected;

"(6) because of the lack of adequate services within the public school system, families are often forced to find services outside the public school system, often at great distance from their residence and at their own expense;

"(7) developments in the training of teachers and in diagnostic and instructional procedures and methods have advanced to the point that, given appropriate funding, State and local educational agencies can and will provide effective special education and related services to meet the needs of handicapped children;

"(8) State and local educational agencies have a responsibility to provide education for all handicapped children, but present financial resources are inadequate to meet the special educational needs of handicapped children; and

"(9) it is in the national interest that the Federal Government assist State and local efforts to provide programs to meet the educational needs of handicapped children in order to assure equal protection of the law.

"(c) It is the purpose of this Act to assure that all handicapped children have available to them, within the time periods specified in section 612(2)(B), a free appropriate public education which emphasizes special education and related services designed to meet their unique needs, to assure that the rights of handicapped children and their parents or guardians are protected, to assist States and localities to provide for the education of all handicapped children, and to assess and assure the effectiveness of efforts to educate handicapped children.".

Ante, p. 773.

(b) The heading for section 601 of the Act (20 U.S.C. 1401) is amended to read as follows:

"SHORT TITLE; STATEMENT OF FINDINGS AND PURPOSE".

DEFINITIONS

SEC. 4. (a) Section 602 of the Act (20 U.S.C. 1402) is amended—

20 USC 1401.

(1) in paragraph (1) thereof, by striking out "crippled" and inserting in lieu thereof "orthopedically impaired", and by inserting immediately after "impaired children" the following: ", or children with specific learning disabilities,";

(2) in paragraph (5) thereof, by inserting immediately after "instructional materials," the following: "telecommunications, sensory, and other technological aids and devices,";

(3) in the last sentence of paragraph (15) thereof, by inserting immediately after "environmental" the following: ", cultural, or economic"; and

(4) by adding at the end thereof the following new paragraphs:

"(16) The term 'special education' means specially designed instruction, at no cost to parents or guardians, to meet the unique needs of a handicapped child, including classroom instruction, instruction in physical education, home instruction, and instruction in hospitals and institutions.

"(17) The term 'related services' means transportation, and such developmental, corrective, and other supportive services (including speech pathology and audiology, psychological services, physical and occupational therapy, recreation, and medical and counseling services, except that such medical services shall be for diagnostic and evaluation purposes only) as may be required to assist a handicapped child to benefit from special education, and includes the early identification and assessment of handicapping conditions in children.

"(18) The term 'free appropriate public education' means special education and related services which (A) have been provided at public expense, under public supervision and direction, and without charge, (B) meet the standards of the State educational agency, (C) include an appropriate preschool, elementary, or secondary school education in the State involved, and (D) are provided in conformity with the individualized education program required under section 614(a)(5).

"(g)(1) If the sums appropriated for any fiscal year for making payments to States under this part are not sufficient to pay in full the total amounts which all States are entitled to receive under this part for such fiscal year, the maximum amounts which all States are entitled to receive under this part for such fiscal year shall be ratably reduced. In case additional funds become available for making such payments for any fiscal year during which the preceding sentence is applicable, such reduced amounts shall be increased on the same basis as they were reduced.

"(2) In the case of any fiscal year in which the maximum amounts for which States are eligible have been reduced under the first sentence of paragraph (1), and in which additional funds have not been made available to pay in full the total of such maximum amounts under the last sentence of such paragraph, the State educational agency shall fix dates before which each local educational agency or intermediate educational unit shall report to the State educational agency on the amount of funds available to the local educational agency or intermediate educational unit, under the provisions of subsection (d), which it estimates that it will expend in accordance with the provisions of this part. The amounts so available to any local educational agency or intermediate educational unit, or any amount which would be available to any other local educational agency or intermediate educational unit if it were to submit a program meeting the requirements of this part, which the State educational agency determines will not be used for the period of its availability, shall be available for allocation to those local educational agencies or intermediate educational units, in the manner provided by this section, which the State educational agency determines will need and be able to use additional funds to carry out approved programs.

"ELIGIBILITY

20 USC 1412. "SEC. 612. In order to qualify for assistance under this part in any fiscal year, a State shall demonstrate to the Commissioner that the following conditions are met:

"(1) The State has in effect a policy that assures all handicapped children the right to a free appropriate public education.

"(2) The State has developed a plan pursuant to section 613(b) in effect prior to the date of the enactment of the Education for All Handicapped Children Act of 1975 and submitted not later than August 21, 1975, which will be amended so as to comply with the provisions of this paragraph. Each such amended plan shall set forth in detail the policies and procedures which the State will undertake or has undertaken in order to assure that--

"(A) there is established (i) a goal of providing full educational opportunity to all handicapped children, (ii) a detailed timetable for accomplishing such a goal, and (iii) a description of the kind and number of facilities, personnel, and services necessary throughout the State to meet such a goal;

"(B) a free appropriate public education will be available for all handicapped children between the ages of three and eighteen within the State not later than September 1, 1978, and for all handicapped children between the ages of three and twenty-one within the State not later than September 1, 1980, except that, with respect to handicapped children aged three to five and aged eighteen to twenty-one, inclusive, the requirements of this clause shall not be applied in any State if the application of such requirements would be inconsistent with State law or practice, or the order of any court, respecting public education within such age groups in the State;

"(C) all children residing in the State who are handicapped, regardless of the severity of their handicap, and who are in need of special education and related services are identified, located, and evaluated, and that a practical method is developed and implemented to determine which children are currently receiving needed special education and related services and which children are not currently receiving needed special education and related services;

"(D) policies and procedures are established in accordance with detailed criteria prescribed under section 617(c); and

"(E) the amendment to the plan submitted by the State required by this section shall be available to parents, guardians, and other members of the general public at least thirty days prior to the date of submission of the amendment to the Commissioner.

"(3) The State has established priorities for providing a free appropriate public education to all handicapped children, which priorities shall meet the timetables set forth in clause (B) of paragraph (2) of this section, first with respect to handicapped children who are not receiving an education, and second with respect to handicapped children, within each disability, with the most severe handicaps who are receiving an inadequate education, and has made adequate progress in meeting the timetables set forth in clause (B) of paragraph (2) of this section.

"(4) Each local educational agency in the State will maintain records of the individualized education program for each handicapped child, and such program shall be established, reviewed, and revised as provided in section 614(a)(5).

"(5) The State has established (A) procedural safeguards as required by section 615, (B) procedures to assure that, to the maximum extent appropriate, handicapped children, including children in public or private institutions or other care facilities, are educated with children who are not handicapped, and that special classes, separate schooling, or other removal of handicapped children from the regular educational environment occurs only when the nature or severity of the handicap is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily, and (C) procedures to assure that testing and evaluation materials and procedures utilized for the purposes of evaluation and placement of handicapped children will be selected and administered so as not to be racially or culturally discriminatory. Such materials or procedures shall be provided and administered in the child's native language or mode of communication, unless it clearly is not feasible to do so, and no single procedure shall be the sole criterion for determining an appropriate educational program for a child.

Administration.

"(6) The State educational agency shall be responsible for assuring that the requirements of this part are carried out and that all educational programs for handicapped children within the State, including all such programs administered by any other State or local agency, will be under the general supervision of the persons responsible for educational programs for handicapped children in the State educational agency and shall meet education standards of the State educational agency.

Notice, hearings. "(7) The State shall assure that (A) in carrying out the requirements of this section procedures are established for consultation with individuals involved in or concerned with the education of handicapped children, including handicapped individuals and parents or guardians of handicapped children, and (B) there are public hearings, adequate notice of such hearings, and an opportunity for comment available to the general public prior to adoption of the policies, programs, and procedures required pursuant to the provisions of this section and section 613.

"STATE PLANS

20 USC 1413. "Sec. 613. (a) Any State meeting the eligibility requirements set forth in section 612 and desiring to participate in the program under this part shall submit to the Commissioner, through its State educational agency, a State plan at such time, in such manner, and containing or accompanied by such information, as he deems necessary. Each such plan shall—

"(1) set forth policies and procedures designed to assure that funds paid to the State under this part will be expended in accordance with the provisions of this part, with particular attention given to the provisions of sections 611(b), 611(c), 611(d), 612(2), and 612(3);

"(2) provide that programs and procedures will be established to assure that funds received by the State or any of its political subdivisions under any other Federal program, including section 121 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 241c-2), section 305(b)(8) of such Act (20 U.S.C. 844a(b)(8)) or its successor authority, and section 122(a)(4)(B) of the Vocational Education Act of 1963 (20 U.S.C. 1262(a)(4)(B)), under which there is specific authority for the provision of assistance for the education of handicapped children, will be utilized by the State, or any of its political subdivisions, only in a manner consistent with the goal of providing a free appropriate public education for all handicapped children, except that nothing in this clause shall be construed to limit the specific requirements of the laws governing such Federal programs; 20 USC 241c-1.

"(3) set forth, consistent with the purposes of this Act, a description of programs and procedures for (A) the development and implementation of a comprehensive system of personnel development which shall include the inservice training of general and special educational instructional and support personnel, detailed procedures to assure that all personnel necessary to carry out the purposes of this Act are appropriately and adequately prepared and trained, and effective procedures for acquiring and disseminating to teachers and administrators of programs for handicapped children significant information derived from educational research, demonstration, and similar projects, and (B) adopting, where appropriate, promising educational practices and materials development through such projects;

"(4) set forth policies and procedures to assure—

"(A) that, to the extent consistent with the number and location of handicapped children in the State who are enrolled in private elementary and secondary schools, provision is made for the participation of such children in the program assisted or carried out under this part by providing for such children special education and related services; and

"(B) that (i) handicapped children in private schools and facilities will be provided special education and related services (in conformance with an individualized educational program as required by this part) at no cost to their parents or guardian, if such children are placed in or referred to such schools or facilities by the State or appropriate local educational agency as the means of carrying out the requirements of this part or any other applicable law requiring the provision of special education and related services to all handicapped children within such State, and (ii) in all such instances the State educational agency shall determine whether such schools and facilities meet standards that apply to State and local educational agencies and that children so served have all the rights they would have if served by such agencies;

"(5) set forth policies and procedures which assure that the State shall seek to recover any funds made available under this part for services to any child who is determined to be erroneously classified as eligible to be counted under section 611(a) or section 611(d);

"(6) provide satisfactory assurance that the control of funds provided under this part, and title to property derived therefrom, shall be in a public agency for the uses and purposes provided in this part, and that a public agency will administer such funds and property;

Reports and records.

"(7) provide for (A) making such reports in such form and containing such information as the Commissioner may require to carry out his functions under this part, and (B) keeping such records and affording such access thereto as the Commissioner may find necessary to assure the correctness and verification of such reports and proper disbursement of Federal funds under this part;

Notice, hearings.

"(8) provide procedures to assure that final action with respect to any application submitted by a local educational agency or an intermediate educational unit shall not be taken without first affording the local educational agency or intermediate educational unit involved reasonable notice and opportunity for a hearing;

"(9) provide satisfactory assurance that Federal funds made available under this part (A) will not be commingled with State funds, and (B) will be so used as to supplement and increase the level of State and local funds expended for the education of handicapped children and in no case to supplant such State and local funds, except that, where the State provides clear and convincing evidence that all handicapped children have available to them a free appropriate public education, the Commissioner may waive in part the requirement of this clause if he concurs with the evidence provided by the State;

"(10) provide, consistent with procedures prescribed pursuant to section 617(a)(2), satisfactory assurance that such fiscal control and fund accounting procedures will be adopted as may be necessary to assure proper disbursement of, and accounting for, Federal funds paid under this part to the State, including any such funds paid by the State to local educational agencies and intermediate educational units;

"(f) Notwithstanding the provisions of subsection (a)(2)(B)(ii), any local educational agency which is required to carry out any program for the education of handicapped children pursuant to a State law shall be entitled to receive payments under section 611(d) for use in carrying out such program, except that such payments may not be used to reduce the level of expenditures for such program made by such local educational agency from State or local funds below the level of such expenditures for the fiscal year prior to the fiscal year for which such local educational agency seeks such payments.

"PROCEDURAL SAFEGUARDS

20 USC 1415. "SEC. 615. (a) Any State educational agency, any local educational agency, and any intermediate educational unit which receives assistance under this part shall establish and maintain procedures in accordance with subsection (b) through subsection (e) of this section to assure that handicapped children and their parents or guardians are guaranteed procedural safeguards with respect to the provision of free appropriate public education by such agencies and units.

"(b)(1) The procedures required by this section shall include, but shall not be limited to—

"(A) an opportunity for the parents or guardian of a handicapped child to examine all relevant records with respect to the identification, evaluation, and educational placement of the child, and the provision of a free appropriate public education to such child, and to obtain an independent educational evaluation of the child;

"(B) procedures to protect the rights of the child whenever the parents or guardian of the child are not known, unavailable, or the child is a ward of the State, including the assignment of an individual (who shall not be an employee of the State educational agency, local educational agency, or intermediate educational unit involved in the education or care of the child) to act as a surrogate for the parents or guardian;

"(C) written prior notice to the parents or guardian of the child whenever such agency or unit—

"(i) proposes to initiate or change, or

"(ii) refuses to initiate or change,

the identification, evaluation, or educational placement of the child or the provision of a free appropriate public education to the child;

"(D) procedures designed to assure that the notice required by clause (C) fully inform the parents or guardian, in the parents' or guardian's native language, unless it clearly is not feasible to do so, of all procedures available pursuant to this section; and

"(E) an opportunity to present complaints with respect to any matter relating to the identification, evaluation, or educational placement of the child, or the provision of a free appropriate public education to such child.

Hearing. "(2) Whenever a complaint has been received under paragraph (1) of this subsection, the parents or guardian shall have an opportunity for an impartial due process hearing which shall be conducted by the State educational agency or by the local educational agency or intermediate educational unit, as determined by State law or by the State educational agency. No hearing conducted pursuant to the requirements of this paragraph shall be conducted by an employee of such agency or unit involved in the education or care of the child.

to the local educational agencies and intermediate educational units of such State in amounts which such agencies and units are eligible to receive under this part after the State educational agency has approved applications of such agencies or units for payments in accordance with section 614(b).

"(b) Payments under this part may be made in advance or by way of reimbursement and in such installments as the Commissioner may determine necessary.".

Regulations. 20 USC 1411 note.

(b) (1) The Commissioner of Education shall, no later than one year after the effective date of this subsection, prescribe—

(A) regulations which establish specific criteria for determining whether a particular disorder or condition may be considered a specific learning disability for purposes of designating children with specific learning disabilities;

(B) regulations which establish and describe diagnostic procedures which shall be used in determining whether a particular child has a disorder or condition which places such child in the category of children with specific learning disabilities; and

(C) regulations which establish monitoring procedures which will be used to determine if State educational agencies, local educational agencies, and intermediate educational units are complying with the criteria established under clause (A) and clause (B).

Proposed regulation, submittal to congressional committees. Publication in Federal Register.

(2) The Commissioner shall submit any proposed regulation written under paragraph (1) to the Committee on Education and Labor of the House of Representatives and the Committee on Labor and Public Welfare of the Senate, for review and comment by each such committee, at least fifteen days before such regulation is published in the Federal Register.

20 USC 402.

(3) If the Commissioner determines, as a result of the promulgation of regulations under paragraph (1), that changes are necessary in the definition of the term "children with specific learning disabilities", as such term is defined by section 602(15) of the Act, he shall submit recommendations for legislation with respect to such changes to each House of the Congress.

Definitions.

(4) For purposes of this subsection:

(A) The term "children with specific learning disabilities" means those children who have a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. Such disorders include such conditions as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. Such term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, of emotional disturbance, or environmental, cultural, or economic disadvantage.

(B) The term "Commissioner" means the Commissioner of Education.

20 USC 1411.

(c) Effective on the date upon which final regulations prescribed by the Commissioner of Education under subsection (b) take effect, the amendment made by subsection (a) is amended, in subparagraph (A) of section 611(a)(5) (as such subparagraph would take effect on the effective date of subsection (a)), by adding "and" at the end of clause (i), by striking out clause (ii), and by redesignating clause (iii) as clause (ii).

AMENDMENTS WITH RESPECT TO EMPLOYMENT OF HANDICAPPED INDIVIDUALS, REMOVAL OF ARCHITECTURAL BARRIERS, AND MEDIA CENTERS

SEC. 6. (a) Part A of the Act is amended by inserting after section 605 thereof the following new sections:

20 USC 1404.

"EMPLOYMENT OF HANDICAPPED INDIVIDUALS

"SEC. 606. The Secretary shall assure that each recipient of assistance under this Act shall make positive efforts to employ and advance in employment qualified handicapped individuals in programs assisted under this Act.

20 USC 1405.

"GRANTS FOR THE REMOVAL OF ARCHITECTURAL BARRIERS

"SEC. 607. (a) Upon application by any State or local educational agency or intermediate educational unit the Commissioner is authorized to make grants to pay part or all of the cost of altering existing buildings and equipment in the same manner and to the same extent as authorized by the Act approved August 12, 1968 (Public Law 90-480), relating to architectural barriers.

20 USC 1406.

"(b) For the purpose of carrying out the provisions of this section, there are authorized to be appropriated such sums as may be necessary.".

Appropriation authorization.

(b) Section 653 of the Act (20 U.S.C. 1453) is amended to read as follows:

"CENTERS ON EDUCATIONAL MEDIA AND MATERIALS FOR THE HANDICAPPED

"SEC. 653. (a) The Secretary is authorized to enter into agreements with institutions of higher education, State and local educational agencies, or other appropriate nonprofit agencies, for the establishment and operation of centers on educational media and materials for the handicapped, which together will provide a comprehensive program of activities to facilitate the use of new educational technology in education programs for handicapped persons, including designing, developing, and adapting instructional materials, and such other activities consistent with the purposes of this part as the Secretary may prescribe in such agreements. Any such agreement shall—

"(1) provide that Federal funds paid to a center will be used solely for such purposes as are set forth in the agreement; and

"(2) authorize the center involved, subject to prior approval by the Secretary, to contract with public and private agencies and organizations for demonstration projects.

"(b) In considering proposals to enter into agreements under this section, the Secretary shall give preference to institutions and agencies—

"(1) which have demonstrated the capabilities necessary for the development and evaluation of educational media for the handicapped; and

"(2) which can serve the educational technology needs of the Model High School for the Deaf (established under Public Law 89-694).

80 Stat. 1027.

"(c) The Secretary shall make an annual report on activities carried out under this section which shall be transmitted to the Congress.".

Report to Congress.

CONGRESSIONAL DISAPPROVAL OF REGULATIONS

Sec. 7. (a)(1) Section 431(d)(1) of the General Education Provisions Act (20 U.S.C. 1232(d)(1)) is amended by inserting "final" immediately before "standard" each place it appears therein.

(2) The third sentence of section 431(d)(2) of such Act (20 U.S.C. 1232(d)(2)) is amended by striking out "proposed" and inserting in lieu thereof "final".

(3) The fourth and last sentences of section 431(d)(2) of such Act (20 U.S.C. 1232(d)(2)) each are amended by inserting "final" immediately before "standard".

(b) Section 431(d)(1) of the General Education Provisions Act (20 U.S.C. 1232(d)(1)) is amended by adding at the end thereof the following new sentence: "Failure of the Congress to adopt such a concurrent resolution with respect to any such final standard, rule, regulation, or requirement prescribed under any such Act, shall not represent, with respect to such final standard, rule, regulation, or requirement, an approval or finding of consistency with the Act from which it derives its authority for any purpose, nor shall such failure to adopt a concurrent resolution be construed as evidence of an approval or finding of consistency necessary to establish a prima facie case, or an inference or presumption, in any judicial proceeding.".

EFFECTIVE DATES

20 USC 1411 note. Sec. 8. (a) Notwithstanding any other provision of law, the amendments made by sections 2(a), 2(b), and 2(c) shall take effect on July 1, 1975.

(b) The amendments made by sections 2(d), 2(e), 3, 6, and 7 shall take effect on the date of the enactment of this Act.

(c) The amendments made by sections 4 and 5(a) shall take effect on October 1, 1977, except that the provisions of clauses (A), (C), (D), and (E) of paragraph (2) of section 612 of the Act, as amended by this Act, section 617(a)(1)(D) of the Act, as amended by this Act, section 617(b) of the Act, as amended by this Act, and section 618(a) of the Act, as amended by this Act, shall take effect on the date of the enactment of this Act.

(d) The provisions of section 5(b) shall take effect on the date of the enactment of this Act.

Approved November 29, 1975.

LEGISLATIVE HISTORY:

HOUSE REPORTS: No. 94-332 accompanying H.R. 7217 (Comm. on
Education and Labor) and 94-664 (Comm. of Conference).
SENATE REPORTS: No. 94-168 (Comm. on Labor and Public Welfare)
and No. 94-455 (Comm. of Conference).
CONGRESSIONAL RECORD, Vol. 121 (1975):
June 18, considered and passed Senate.
July 21, 29, considered and passed House, amended, in lieu of
H.R. 7217.
Nov. 18, House agreed to conference report.
Nov. 19, Senate agreed to conference report.
WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 11, No. 49:
Dec. 2, Presidential statement.

89 STAT. 796

APPENDIX II

CALIFORNIA STATE DEPARTMENT OF EDUCATION
Office of Special Education
721 Capitol Mall
Sacramento, California 95814
and
One Bunker Hill, 601 W. Fifth Street, Suite 1014
Los Angeles, California 90017

KEY POINTS REGARDING PROGRAMS FOR SEVERE LANGUAGE HANDICAPPED MINORS IN CALIFORNIA
(Aphasic)

MANDATORY PROGRAM

Programs for the aphasic and other severe oral language handicapped minors are mandatory for pupils between six and 21 years of age as set forth in Education Code Sections 894, 6801-6812. Programs are permissive beginning at three years of age and with prior approval of the Superintendent of Public Instruction permissive at 18 months of age. (Education Code Sections 6806 and 6812.5). Programming for the severely language handicapped including aphasic within the provisions of the Master Plan for Special Education are mandated in Education Code Sections 7000-7041, 17303.7 and 26405; and Title 5, California Administrative Code Sections 3300-3390.

HISTORY

Special Education programs for aphasic pupils in the public schools have existed since 1960. The earliest programs were established in Berkeley and Garden Grove. Parents played a significant role in initiation of programs in meeting the special needs of their children with severe language disorders.

PHILOSOPHY

The program for the aphasic and/or severe oral language handicapped is dedicated to providing special education services to the child having severe difficulty with the language process. Because of the complex nature of the linguistic behavior of a child with a severe language disorder, it is important to:

1.0 Describe the child's linguistic difficulties as distinctly and concisely as possible;

2.0 Observe non-linguistic behaviors that affect language performance; and

3.0 Consider these observations as part of and influence on the total developmental and learning patterns of a child.

In order to properly program in the schools for the aphasic and/or severe oral language handicapped, it is necessary to understand the child's language performance in both comprehension and production (reception and expression). Therefore performance in terms of phonology (sounds), syntax, and morphology (grammar), and semantics (concepts) are all essential ingredients in developing a comprehensive program for these pupils. A language disorder is defined as the abnormal acquisition, comprehension, or use of spoken or written language.

DEFINITION OF THE APHASIC AND/OR SEVERE ORAL LANGUAGE HANDICAPPED

Section 3600 (g) of Title 5 of the California Administrative Code reads:

> "The aphasic and/or other severe oral language handicapped. A minor is aphasic and/or other severe oral language handicapped when all of the following statements apply to him or her:
>
> (1) The minor has a severe disability in the comprehension and/or expression of oral language. A minor may be considered to have a severe oral language disorder when:
>
> (a) The minor shows normal intellectual potential as measured by instruments that do not require oral expression.
>
> (b) The minor's score on the auditory verbal scale of one or more standard tests or sub-tests of language assessment falls two standard deviations below the mean for the minor's mental age as indicated in (a), except that any minor above the two standard deviations but below one standard deviation may be designated as an aphasic and/or other severe oral language handicapped if agreed upon with the unanimous decision of the admission committee.
>
> (c) The minor is nonverbal or when a spontaneous language sample of at least 50-100 utterances can be obtained the sample shows development judged clearly inadequate for the minor's age in at least two of the following areas of language development: syntactic, semantic, morphologic, phonologic.
>
> (2) The disability is of such severity as to require enrollment in a special day class, intensive remedial instruction, an integrated program of instruction, or instruction under Education Code Sections 6670-6874.6.
>
> (3) Aphasia and/or other severe oral language handicap is evidenced by written statements certifying that the minor has a severe speech and/or oral language disorder, not due to deafness, mental retardation, or autism. This determination of aphasia and/or other severe oral language handicap shall be made in written statements by personnel in each of the following

specific professional capacities:

(a) A teacher credentialed in the area of the speech and hearing handicapped, or a credentialed speech and hearing specialist, or a speech pathologist who holds certification in speech pathology in the American Speech and Hearing Association shall determine that the child has an aphasic and/or other severe oral language disorder and that the condition is not primarily due to deafness.

(b) A credentialed or licensed psychologist or licensed educational psychologist shall determine the child's intellectual and emotional capabilities and shall determine that the condition is not due to mental retardation or autism.

(4) A licensed physician who has training and/or experience with children who have neurological disorders shall determine if neurological dysfunction or other physical disorders exist and how these disorders may be associated with aphasia and/or other severe oral language handicaps.

STANDARDS FOR EVALUATION, PLACEMENT, AND REVIEW

Section 3760 of Title 5 of the California Administrative Code reads: "(a) Admission of minors to programs for the aphasic and/or other severe oral language handicapped shall be made only on the basis of an individual evaluation and upon individual recommendation of an admission committee which shall include an administrator in charge of special education programs in the school district or county or administrator designated by the school district or county superintendent of schools, a credentialed teacher of the aphasic and/or severe oral language handicapped, a speech, hearing and language specialist who has examined the minor under consideration for eligibility and placement, and a school psychologist or other pupil personnel worker authorized to serve as a school psychologist who has examined the minor under consideration for eligibility and placement. The admission committee shall use such health reports as are needed to properly evaluate the minor. The admission committee shall have the services or presence of other pupil personnel workers, educational specialists, school nurses, social workers, physicians or classroom teachers as the committee may require and request.

The recommendation shall include a statement, that in the professional judgment of the members of the admission committee the minor is recommended for placement in a program for aphasic and/or severe oral language handicapped minors to ameliorate a marked language disability. Any member of the admission committee dissenting from the final committee recommendation shall attach to the final recommendation a statement of reasons for such objection.

(b) The admission committee and the minor's teacher shall annually:

(1) Review the appropriateness of the placement of minors in special educational programs under the provisions of this chapter.

(2) Submit recommendations as to the return of such minor to the regular school program, continuance in the program for the aphasic and/or other severe oral language handicapped, transfer to other special education programs, or referral to other agencies.

(c) A special class teacher for the severe language handicapped and/or aphasic pupil shall hold a special education teaching credential or a services credential in language, speech, and hearing which shall include a special class authorization.

(Section 3760 of Section 2 of Article 14, Chapter 4 of Division 3 of Title 5 of the California Administrative Code.)

SERVICES PROVIDED IN AN APHASIC AND/OR SEVERE ORAL LANGUAGE HANDICAPPED PROGRAM

1.0 Special day classes (Education Code Section 6802.1)

(a) self-contained (E.C. Section 6802.1 (a)
(b) integrated (E.C. Section 6802.1 (c)

2.0 Intensive remedial instruction (E.C. Section 6802.1 (d)

3.0 Individual instruction (E.C. Section 6802.1 (e)

CLASS SIZE

Maximum class sizes for the aphasic and/or severe oral language handicapped are 6 for ages 3-8; and 8 for ages 9-20. (Education Code Section 6802.2).

FUNDING SOURCES

Current funding support of State apportionments for the aphasic programs is based on ADA and special education allowances. (E.C. Section 18102 and 18102.9).

TEACHER QUALIFICATIONS

A valid credential authorizing service as a language, speech, and hearing specialist is required. (E.C. Sections 6820, 13135, and 13139; California Administrative Code, Title V, Sections 3340, 3760(c), 6570-6575 and 6596-6598).

PHYSICAL FACILITIES

Many school districts are eligible for State School Building Aid to build and equip classrooms. Current area allowance for the aphasic program is: 1,235 sq. ft. (k-8); 1,335 sq. ft. (7-9); and 1,360 sq. ft. (9-12). (Title 2, Section 1810-1, Office of Local Assistance).

TRANSPORTATION

Provisions are made for transportation allowance under E. C. Sections 6807, 6808 and 18060.

STATE DEPARTMENT OF EDUCATION - Program Consultants

Office of Special Education, Special Education Programs

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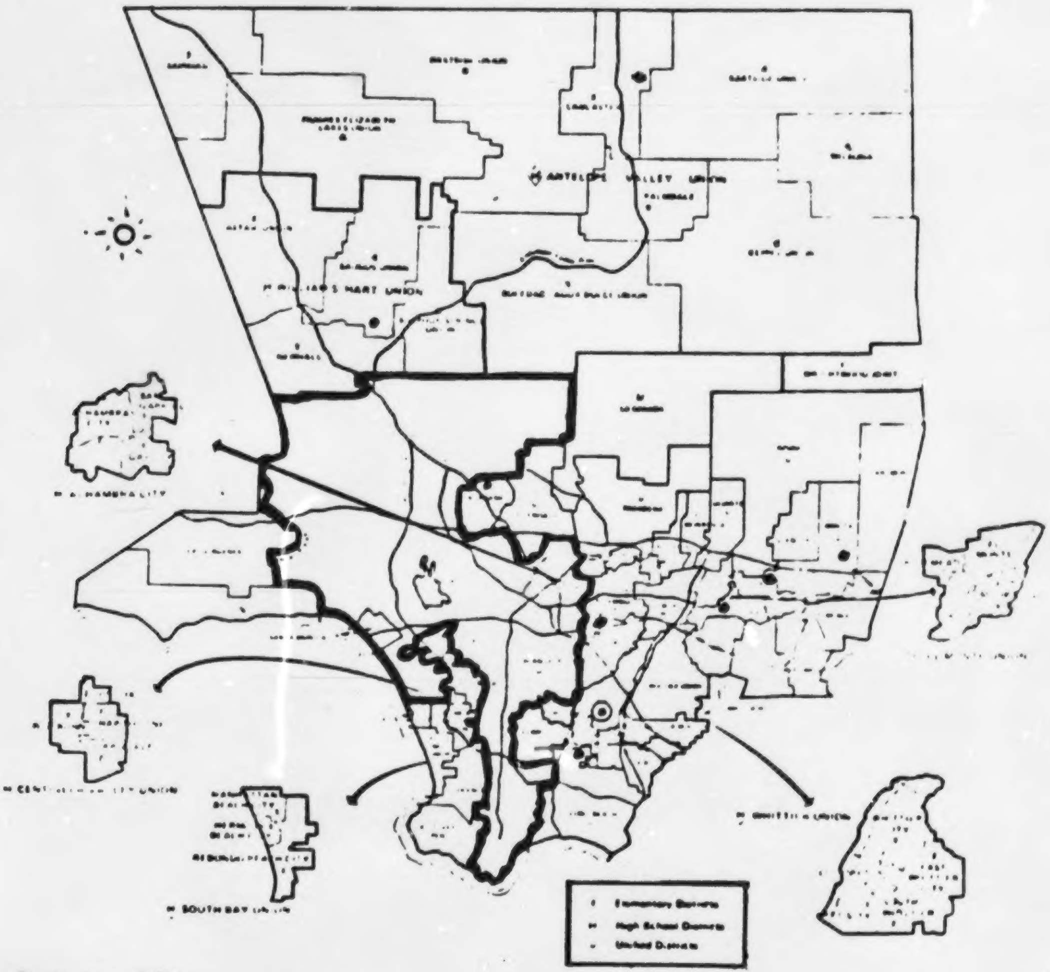
June, 1976

ELEMENTARY, HIGH SCHOOL AND UNIFIED DISTRICTS

Los Angeles County



⊙ County Office
● Administrative sites of Language Disorders Program
Distance from office (1 way):
Avon, Burbank = 28
Bella Vista, Monterey Park = 14
California, West Covina = 18
Canyon View, San Dimas = 35
Emblem, Saugus = 53
Fair Valley, Covina = 24
Hoxie, Norwalk = 2
Kit Carson, Lawndale = 21
Monroe, Lakewood = 9
Park View, Lancaster = 87
▬ Area inside boundary not included

APPENDIX IV

OFFICE OF THE LOS ANGELES COUNTY SUPERINTENDENT OF SCHOOLS
DIVISION OF SPECIAL EDUCATION

9300 East Imperial Highway, Downey, California 90242

PARENT QUESTIONNAIRE
SLD/Aphasia

Dear Parent: We ask your cooperation in our efforts to better understand the needs of your child and to assist us in the most appropriate educational placement. Please complete the following questionnaire and mail to the above address. We must have this information before we can see your child for evaluation:

Date: ____________________

Child's Name: ______________________________ Sex: ____ Birthdate: ________ Age: ____ Grade: ______

Permanent Address: ____ Phone: __________
Street City Zip Code

We have no home phone, but may be reached by calling:

Name: ____ Phone: __________

	Full Name	Age	Education	Occupation	Phone
Mother:					
Father:					
Legal Guardian:					

Other Children: (List in order of age)

Name	Age	Relationship	School Grade	School Difficulties

Others in Home: ____
Name Relationship

Please describe your child's problem or your concern about him:

What pleases you most about your child?

MH:JT:lmo
Form No. 301-313
Revised 7/75

Prenatal Information:

Length of Pregnancy:____________________ Rh Factor:__________

Mother's Illnesses or Accidents:____________________

Other:____________________

Birth: Term:______ Premature:______ Late:_____ Birth Wt.:__________

Length of Labor:__________

Presentation: Head:_____ Breech:____ Other:____ Cesarean Section:______

Anesthesia:______________

Complications of Delivery: Difficulty Breathing:___ Cord around neck:______

Color:______ **Cry**: Weak:______ Strong:______

Resuscitation:_____ If Used: (Oxygen Drugs Incubator)

Other:____________________

Describe any feeding or diet problems: (During first year of life):__________

____

Describe sleeping and rest habits:____________________

____

Development:

At what age did he/she begin to:

(1) Sit______________

(2) Crawl______________

(3) Walk Alone______________

(4) Run______________

(5) Skip______________

Bladder Training__________

Language: First Word:________

(6) Dress Self______________

(7) Feed Self______________

(8) Tie Shoes______________

(9) Ride Tricycle__________

(10) Ride Bicycle__________

Bowel Training__________

Combine two-word sentences_____

Health History:

Colic:__________ Allergies__________ Convulsions____ High Fevers__________

Anything Unusual?____________________

Childhood Illnesses: (At what age, how severe, special treatment or medication)

Rubella (3 day German) or Rubeola regular measles__________

Mumps____________________

Chicken Pox____________________

Ear Infections____________________

Pneumonia____________________

Scarlet Fever____________________

Other:____________________

Any Chronic Condition____________________

Current Medication__________ Dose__________ Reason__________

Hospitalization:

Where	Date	Illness	Child's reaction to?

Accidents:

What Kind?	What Treatment	Child's Attitude Toward?

Does child wear glasses?__________ Since what date?__________

Does child wear hearing aid?__________ Since what date?__________

Special Tests: (EEG, etc.)____________________

List Audiologists, Eye Specialists, and Hearing Aid Dispensers who have cared for your child.

Name	Address	Phone

Family Doctor: ______________________________
Name Address Phone

List other doctors and agencies who have cared for your child.

Date Name Address Reason

____

____

____
(BE SURE to include hospital or clinic file numbers)

At any time in his development did child do any of the following: Give ages:

Frequent crying ____________
Withdrawal from others ____________
Temper tantrums ____________
Destructiveness ____________
Lying ____________
Fighting ____________
Stuttering ____________

Nail Biting ____________
Thumb sucking ____________
Pulling of hair ____________
Daydreaming ____________
Bed wetting ____________
Fall (coordination) ____________
Overactive ____________

Do any of these terms seem to apply to your child?

Timid ____________
Sensitive to Criticism ____________
Fearful ____________
Nervous ____________
Too near ____________
Independent ____________
Prefers to be alone ____________
Clumsy ____________

Sad ____________
Moody ____________
Friendly ____________
Affectionate ____________
Irritable ____________
Bossy ____________
Restless sleeper ____________
Prefers company of adults ____________

Discuss any behavior that is a problem to parents: (i.e. overactivity, withdrawal, sensitivity)

How much T.V. does the child watch? ____________

What are child's favorite activities? ____________

How does he relate to (play with) other children?____________________

____

What is your type of residence: Separate home____ Apartment____ Mobile home__________
Other: (Please specify)__________

What are the most frequent discipline problems with your child?

Who does most disciplining and how?____________________

Do you feel your child's speech has changed in the last 3-6 months?__________

Do you feel he has changed in behavior in the last 3-6 months?__________

Is there any family history of the following?	Relationship to child
Late in learning to speak__________	__________
Poor school achievement, repeated grades, etc.__________	__________
Reading Problem__________	__________
Speech or hearing disorder__________	__________
Mental retardation__________	__________
Epilepsy or Seizures__________	__________

____
Signature of person completing this form

____
Relationship to child

HISTORY OF SPEECH AND LANGUAGE DEVELOPMENT

Please read the following phrases carefully and mark each one that you feel describes your child. You may check more than one phrase under each heading if you think that more than one applies. You are encouraged to write in additional remarks under each heading. For example, one phrase may describe the child at one stage of development but now he behaves differently. If this is a possibility, then put approximate ages when this phrase best describes the child.

Crying (between infancy and one year)

____ Baby did not cry

____ Baby cried very little

____ Baby cried to make wants known

____ Baby was fussy and difficult

____ Baby cried all of the time for no known reason

____ Baby's crying differed from brothers and sisters

Additional remarks: ______________________________

____

Attention (between infancy and one year)

____ Baby was in his own world - - rarely attended to anyone

____ Baby was seldom attentive to anyone

____ Baby was attentive to mother and/or father

____ Baby was attentive and loving

____ Baby was overly good

Additional remarks: ______________________________

____

Babbling

____ Baby did not babble (cooing) at all

____ Baby did not babble very much

____ Baby babbled as would be expected

____ Baby started babbling normally and then stopped

Babbling (continued)

____ Baby babbled all of the time

____ Baby's babbling differed from your other children

Additional remarks: ____

Imitation of Sounds and Words

____ Baby did not attempt to imitate sounds and words

____ Baby imitated sounds and words only occasionally

____ Baby imitated sounds and words and then stopped

____ Baby did not properly imitate sounds and words

____ Baby's sound and word imitations differed from your other children

Additional remarks: ____

First Words

____ Child did not say any words "on his own"

____ Child began to say words and then stopped, at what age? __________

____ Child began to say words before age one

____ Child began to say words between ages one and two

____ Child began to say words after age three. Give age. __________

Additional remarks: ____

Words and Phrases

____ Child has not begun to put words together

____ Child began to put words together and then stopped. At what age? ____

____ Child began to put words together between ages one and two

____ Child began to put words together between ages two and three

____ Child began to put words together after age three. Give age ______

Additional remarks: ____

Using Words Appropriately

____ Child never used words appropriately

____ Child began using words appropriately between ages 1 and 2 1/2

____ Child began using words appropriately between ages 2 1/2 and 4

____ Child began using words appropriately after four years of age

____ You have not noticed that child uses words inappropriately

Additional remarks: ______________________________

____

Articulation

____ It is hard for you to understand your child

____ Child is understood at home but not elsewhere

____ Child has difficulty with certain sounds

____ Child is understood by everyone

____ Child speaks more plainly than he did six months ago

Additional remarks: ______________________________

____

Hearing

____ Child does not respond to loud sounds (airplane, telephone)

____ Child responds to loud sounds but not speech

____ Child is afraid or bothered by loud sounds

____ Child sometimes appears to hear well and at other times does not.

Give specific examples: ______________________________

____

____ Child appears to hear normally

Additional remarks: ______________________________

____

Understanding of What is Heard

____ Child does not appear to understand speech

____ Child follows directions when accompanied by gestures

____ Child understands what is said without the use of gestures

____ Child can follow double commands, i.e. "Put your shoes away and bring me your coat."

____ Child appears to understand normally for his age

Additional remarks: ____

Word Usage

____ Child only uses words or sounds that he mimics or imitates

____ Child commonly uses 20 or less single words correctly

____ Child uses 2 word phrases

____ Child speaks in 3 and 4 word phrases

____ Child vocabulary and sentence usage appear normal for his age

Additional remarks: ____

Gesture "Talks" with his hands and/or other body parts to express ideas

____ Child takes us to what he wants and points

____ Child uses specific gestures to represent objects and ideas

____ Child uses highly developed gesture system for communication

____ Child uses gestures when appropriate with speech

____ Child uses gestures only when his speech cannot be understood

Additional remarks: ____

OFFICE OF THE LOS ANGELES
COUNTY SUPERINTENDENT OF SCHOOLS
DIVISION OF SPECIAL EDUCATION
(FORM NO. [illegible])

MEDICAL REPORT/CERTIFICATION

(To be completed by physician only)

LAST NAME ____ FIRST ____ MIDDLE ____ DATE OF BIRTH ____ SEX ____

STREET ADDRESS ____ CITY ____ ZIP CODE ____

NAME OF PARENT/GUARDIAN/CARETAKER ____ SCHOOL DISTRICT ____

Height ____ **Weight** ____ **Nutritional Status** ____ **Body Build** ____

Allergies ____ **Skin Condition** ____

Ears ____ **Nose** ____ **Throat** ____ **Eyes** ____

Dental Decay: No ☐ Yes ☐ **Malocclusion:** No ☐ Yes ☐ **Other:** ____

Hearing Loss: No ☐ Yes ☐ **Extent** ____ **Type** ____

Speech/Language Development ____

Snellen: R20/____ L20/____ Both 20/____ **Lenses: Prescribed ?** No ☐ Yes ☐

Visually Handicapped: No ☐ Yes ☐ **Etiology/Diagnosis** ____

Cardiac Evaluation ____ **Respiratory Function** ____

Gastro Intestinal ____ **Urinary Problem** ____

Medical Problems ____

Genetic/Metabolic/Congenital/Anomalies: No ☐ Yes ☐ **Explain** ____

Orthopaedic Dysfunction: No ☐ Yes ☐ **Cause/Extent** ____

Mobility ____ **Appliances** ____

Coordination-Fine Motor ____ **Gross Motor** ____

Neurologically Handicapped: No ☐ Yes ☐ **Area Involved** ____

E.E.G. Date ____ **Results** ____

Brain Scan Date ____ **Results** ____

Seizure Disorder: No ☐ Yes ☐ **Type/Control** ____

Hyperactive: No ☐ Yes ☐ **Extent** ____

Behavior Disorder: No ☐ Yes ☐ **Type** ____

Developmental Delay: No ☐ Yes ☐ **Level of Function** ____

(REVERSE SIDE MUST BE COMPLETED)

OFFICE OF THE LOS ANGELES COUNTY
SUPERINTENDENT OF SCHOOLS
Division of Special Education
Severe Language Disorders/Aphasia

NAME:
PARENTS/GUARDIAN:
ADDRESS:
TELEPHONE:
SCHOOL DISTRICT:
BIRTHDATE: CA:
PLACEMENT: FROM: TO:
DATE OF EVALUATION:

photo

Form No. 301-230
Rev. 9/75

OFFICE OF THE LOS ANGELES COUNTY SUPERINTENDENT OF SCHOOLS
DIVISION OF SPECIAL EDUCATION
LANGUAGE DISORDERS-APHASIA PROGRAM

Name________________________ B.D.__________ School District________________________

Entry Assessment (○)_____ First Assessment (□) _____ Second Assessment (△)_____

'ercent
)f cases
ınder
)ortions
)f the
ıormal
:urve

Standard
Deviations

Percent	Standard Deviations
	+4
0.13%	
	+3
2.14%	
	+2
13.59%	
	+1
34.13%	
	0
34.13%	
	-1
13.59%	
	-2
2.14%	
	-3
0.13%	
	-4

Name of Test	Code	Score ○	Score □	Score △
Leiter	01			
Peabody Picture Voc.	32			
WISC Verbal	04			
WISC Performance	05			
WISC Full Scale	03			
Information	06			
Similarities	09			
Arithmetic	08			
Vocabulary	10			
Comprehension	07			
Digit Span	11			
Picture Completion	12			
Picture Arrangement	13			
Block Design	14			
Object Assembly	15			
Coding	16			
Mazes	17			
Animal House	27			
Geometric Design	30			
ITPA: Auditory Reception	33			
Aud. Association	35			
Verbal Expression	37			
Grammatic Closure	39			
Auditory Memory	41			
Auditory Closure	43			
Sound Blending	44			
Visual Reception	34			
Visual Association	36			
Manual Expression	38			
Visual Closure	40			
Visual Memory	42			

Assessment:
Examiners:

Date:
Test Environment:
CA:

Assessment:
Examiners:

Date:
Test Environment:
CA:

Assessment:
Examiners:

Date:
Test Environment:
CA:

	Code	M	SD	Date	Raw Score	Age Score	Scaled Score	Date	Raw Score	Age Score	Scaled Score	Date	Raw Score	Age Score	Scaled Score
LEITER INTERNATIONAL	01	100	16												
STANFORD BINET	02	100	16												
WISC-R/WPPSI/WAIS															
Verbal	04	100	15												
Performance	05	100	15												
Full Scale	03	100	15												
Information	06	10	3												
Similarities	09	10	3												
Arithmetic	08	10	3												
Vocabulary	10	10	3												
Comprehension	07	10	3												
Digit Span	11	10	3												
Picture Completion	12	10	3												
Picture Arrangement	13	10	3												
Block Design	14	10	3												
Object Assembly	15	10	3												
Coding	16	10	3												
Mazes	17	10	3												
Animal House	27	10	3												
Geometric Design	30	10	3												
MERRIL PALMER	137														
ARTHUR POINT SCALE II	129	100	16												

Assessment:
Examiners:

Date:
Test Environment:
CA:

Assessment:
Examiners:

Date:
Test Environment:
CA:

Assessment:
Examiners:

Date:
Test Environment:
CA:

	Code	M	SD	Date	Raw Score	Age Score	Scaled Score	Date	Raw Score	Age Score	Scaled Score	Date	Raw Score	Age Score	Scaled Score
PEABODY PIC. VOCAB.	32	100	15												
ITPA															
Auditory Recp.	33	36	6												
Auditory Assn.	35	36	6												
Verbal Express.	37	36	6												
Grammatic Closure	39	36	6												
Auditory Memory	41	36	6												
Auditory Closure	43	36	6												
Sound Blending	44	36	6												
Visual Recp.	34	36	6												
Visual Assn.	36	36	6												
Manual Express.	38	36	6												
Visual Closure	40	36	6												
Visual Memory	42	36	6												
DETROIT TESTS															
Pictorial Absurd.	72														
Aud. Attn. Unrelated	77														
Aud. Attn. Related	84														
Orientation	81														
Oral Commissions	78														
Social Adjust. A	79														
Number Ability	85														
Oral Directions	89														
Pictorial Oppos.	74														
Verbal Oppos.	75														
ACLC															
1 Element	53														
2 Elements	54														
3 Elements	55														
4 Elements	56														
NSST															
Receptive	57														
Expressive	58														
NSST-County Norms															
Receptive	57														
Expressive	58														

1. According to Vent Norms
2. According to Highest Norms Available (10-0 to 10-3)

Assessment:
Examiners:

Date:
Test Environment:
CA:

Assessment:
Examiners:

Date:
Test Environment:
CA:

Assessment:
Examiners:

Date:
Test Environment:
CA:

	Code	M	SD	Date	Raw Score	Placemt. Grade	Scaled Score	Date	Raw Score	Placemt. Grade	Scaled Score	Date	Raw Score	Placemt. Grade	Scaled Score
WRAT															
Reading	47														
Spelling	45														
Arithmetic	46														
DURRELL															
Oral Reading	91														
Silent Reading	92														
Listen. Comp.	93														
Flash Words															
Word Analysis	94														
Vis. Mem. for Words	59														
Sounds in Words	100														
Phonic Spelling	104														
Spelling	105														
Handwriting	106														
GATES MacGINITIE-READINESS															
Listen. Comp.															
Aud. Discrim.															
Vis. Discrim.															
Foll. Directions															
Letter Recog.															
Vis. Mot. Coord.															
Aud. Blending															
Word Recognition															

Areas to discuss

Oral motor skills
Articulation
Language sample
Auditory discrim.
Elicited imitation

Assessment: **Examiners:** **Date:** **Test Environment:** **CA:**	**Assessment:** **Examiners:** **Date:** **Test Environment:** **CA:**	**Assessment:** **Examiners:** **Date:** **Test Environment:** **CA:**

APPENDIX V

Ratings for Oral Motor Ability and Articulation

Oral Motor Skills

Rating	Comments in Records
No difficulty	Within normal limits, adequate, no problem
Suggestive	Fast alternating movements somewhat slow or hesitant, difficulty with rapid sequencing of three syllables, suspected difficulty, suggest further evaluation
Clearly a problem	Significant dysarthria, drooling, severe apraxia, diadokokinetic rates extremely slow, unable to sequence two syllables, cleft palate, submucous cleft

Articulation

Rating	Comments in Records
Normal	Normal ability for age, adequate for age, intelligibility good, no difficulty noted
Mild	No more than two of the following mentioned: mild lisp, substitutions on blends, distortions, no more than 2 phonemes omitted or substituted, (substitutions and omissions must be stimulable)
Moderate	Omissions and frequent substitutions, omission of all sibilants, inconsistently stimulable (3 to 6 sound errors noted)
Severe	Severe articulation problem, unintelligible except in context, more than 6 phonemes omitted or substituted.

APPENDIX VI

Correlation Matrix for Measures Considered in Selection of Dependent Variable

		PPVT	NSST R	AUD REC	NSST E	VERB EXP	MAN EXP	GRAM CLOZ	MUL	AUD ASSN	DTLA ORIENT	DTLA VERB. OP	ELICT IMIT	DTLA REL SYL	ORAL MOTOR	ARTIC	READING	SPELLING	MATH	AUD MEM	VIS MEM	DTLA UNREL SYL
RECEPTIVE	PPVT																					
	NSST/R	.71 (629)																				
	ITPA AUD REC	.75 (673)	.66 (654)																			
EXPRESSIVE	NSST/E	.63 (615)	.65 (640)	.57 (638)																		
	ITPA VERB EXP	.71 (665)	.63 (650)	.67 (701)	.66 (634)																	
	ITPA MAN EXP	.57 (649)	.53 (633)	.53 (683)	.52 (617)	.63 (678)																
	ITPA GRAM CLOZ	.74 (663)	.66 (644)	.70 (698)	.77 (628)	.75 (694)	.55 (675)															
	MUL	.61 (557)	.55 (538)	.51 (574)	.61 (524)	.61 (570)	.47 (550)	.62 (565)														
COMBINED	ITPA AUD ASSN	.84 (673)	.73 (655)	.78 (709)	.69 (639)	.77 (702)	.59 (682)	.84 (701)	.59 (574)													
	DTLA ORIENT	.68 (105)	.65 (106)	.67 (114)	.70 (108)	.65 (113)	.39 (111)	.74 (114)	.57 (87)	.78 (115)												
	DTLA VERB OPP	.51 (60)	.51 (58)	.42 (65)	.53 (57)	.55 (64)	.55 (58)	.66 (64)	.40 (56)	.63 (65)	.70 (38)											
	ELICT IMIT	.58 (581)	.53 (578)	.52 (606)	.79 (565)	.61 (600)	.47 (583)	.71 (597)	.65 (521)	.62 (606)	.59 (92)	.47 (54)										
	DTLA REF SYL	.57 (140)	.54 (138)	.54 (150)	.72 (137)	.48 (148)	.24* (141)	.68 (148)	.46 (120)	.64 (152)	.60 (109)	.59 (53)	.69 (122)									
PRODUCT. ABILITY	ORAL MOTOR	.17 (503)	.17 (496)	.10 (524)	.29 (490)	.24 (517)	.17 (503)	.24 (517)	.31 (444)	.15 (524)	.14** (111)	.10** (64)	.36 (465)	.15* (147)								
	ARTIC	.31 (505)	.26 (497)	.25 (525)	.49 (491)	.36 (518)	.25 (504)	.42 (518)	.43 (445)	.30 (525)	.27* (112)	.48 (64)	.50 (466)	.37 (149)	.49 (527)							
ACADEMIC	WRAT READ	.57 (516)	.45 (506)	.47 (535)	.58 (499)	.52 (528)	.42 (515)	.58 (528)	.44 (453)	.59 (535)	.48 (93)	.43 (58)	.54 (475)	.38 (127)	.19 (519)	.29 (521)						
	WRAT SPELL.	.62 (511)	.53 (500)	.54 (530)	.60 (492)	.56 (522)	.48 (510)	.61 (523)	.47 (451)	.64 (530)	.55 ([illegible])	.48 ([illegible])	.54 (468)	.41 (128)	.20 (523)	.28 (531)	.84 (510)					
	WRAT MATH	.63 (509)	.55 (501)	.52 (529)	.60 (495)	.60 (522)	.49 (508)	.63 (522)	.51 (447)	.67 (529)	.68 (100)	.53 (61)	.52 (468)	.43 (133)	.21 (527)	.29 (529)	.79 (528)		.81 (528)			
MEMORY	AUD ITPA MEM	.57 (668)	.53 (649)	.49 (704)	.66 (633)	.58 (696)	.46 (681)	.63 (697)	.49 (570)	.61 (706)	.42 (114)	.46 (63)	.64 (602)	.62 (149)	.23 (521)	.36 (522)	.57 (532)	.57 (527)	.57 (526)			
	VIS ITPA MEM	.58 (644)	.52 (631)	.52 (678)	.50 (616)	.58 (673)	.55 (665)	.56 (669)	.38 (546)	.59 (677)	.45 (107)	.37 *(56)	.46 (580)	.40 (137)	.20 (504)	.27 (505)	.52 (514)	.57 (509)	.60 (509)	.51 (675)		
	DTLA UNREL. SYL	.55 (119)	.56 (116)	.50 (124)	.57 (117)	.49 (122)	.32 (117)	.51 (122)	.47 (99)	.55 (124)	.49 (95)	.48 (43)	.53 (102)	.61 (116)	.05** (121)	.34 (122)	.40 (106)	.46 (107)	.45 (111)	.53 (122)	.44 (116)	

All significant at p<.001 level except:*p<.01 , ** N.S.

APPENDIX VII

Intercorrelation Matrices for Independent Variable Clusters
A. Socioeconomic/Family Status and Program Status

	Mo. Ed.	Fath. Ed.	Fath. Occup.	Resid.	Biling.	# Sibs.
Mo. Ed.						
Fath. Ed.	** .65					
Fath. Occup.	** .35	** .45				
Residence	* -.10	* -.09	* -.07			
Bilingual	** -.37	** -.31	** -.14	.03		
# Sibs.	** -.24	** -.25	.02	** -.10	** .21	

Note: N = 540-705

	Time in Prog.	# Moves	Enroll Status	Rec. Ed. Plcmt.	Reason Disch.	Itin. Status	Prior Moves
Time in Prog.							
# Moves in Prog.	** .29						
Enroll. Status	** -.38	** .14					
Rec. Ed. Plcmt.	.08	.05	a				
Reason Disch.	.09	.00	a	** .36			
Itinerant Stat.	.07	* -.12	a	** -.40	** -.30		
Prior Moves	-.02	.04	* .07	.11	.07	** -.16	

Note: N = 390-718 (approximately half of the subjects were still enrolled in the program and therefore had no discharge reason or alternate recommendation).

a = not calculated due to reduced N.

* = p < .05
**= p < .01

APPENDIX VII

Intercorrelation Matrix for Independent Variables

B. Physical Cluster

	Moth. Ill.	Mo. Age Birth	Birth-wt.	Complic.	Fd. Diff.	Slp. Diff.	Age Walk	Child. Ill.	Meds.	Hosp.	Accdt.	Sp. Test	Add. MD	+ Neuro.	Clumsy	Hg. Loss	Vis. Prob.	Fam. Hx.
Moth's Ill.																		
Mo. Age/Birth	-.01																	
Birthwt.	-.05	-.01																
Complicat.	.08	.04	-.17**															
Fd. Diff.	-.00	-.02	-.09*	.11**														
Slp. Diff.	.12**	-.02	-.09**	.05	.19**													
Age Walk	.08*	.01	-.13**	.03	.19**	.07												
Child's Illn.	.09*	.02	-.01	.01	.15**	.13**	.01											
Medicat.	.10**	.05	.01	.02	.11**	.24**	.10**	.14**										
Hospitaliz.	.18**	-.05	-.11**	.14**	.17**	.10**	.20**	.22**	.13**									
Accidents	.07*	-.12**	-.01	.03	.01	.06	-.03	.09*	.10**	.09*								
Spec. Tests	.10**	-.03	-.08*	.11**	.12**	.25**	.19**	.18**	.47**	.23**	.09*							
Addtl. MD's.	.15**	-.04	-.06	.16**	.20**	.17**	.20**	.21**	.28**	.23**	.07	.34**						
+ Neurol.	.04	.01	.00	.15**	.08*	.18**	.16**	.14**	.31**	.15**	.01	.45**	.25**					
Clumsiness	.16**	-.05	-.01	.04	.05	.27**	.20**	.13**	.31**	.21**	.15**	.27**	.31**	.19**				
Hearing Loss	.11**	-.03	-.14**	.10	.06*	.04	.07*	.07*	-.02	.12**	-.02	.04	.10*	.00	-.02			
Visual Prob.	-.01	-.03	-.01	-.01	.05	.07*	.09*	.07*	.02	-.01	.01	.03	.11**	.03	.04	-.03		
Family Hx.	.03	.01	.02	-.06	-.14**	-.04	-.14**	.08*	-.07	-.03	.04	-.01	.08*	.02	-.02	-.06	-.08	

Note: N = 432-671

* = p < .05

**= p < .01

APPENDIX VII

Intercorrelation Matrix for Independent Variables
C. Language History Cluster

	Artic.	Artic. Imp.	1st Wd.	2-Wds.	Hearing	Approp. Sp.	Crying	Attn. to Caregiver	Imitate	Current Usage	Gesture	Comprehen.
Artic.												
Artic. Improv.	.23**											
1st Word	.19**	.05										
2-Words	.20**	.14**	.53**									
Hearing	.09*	.13**	-.05	-.01								
Approp. Sp.	.24**	.03	.29**	.36**	.09*							
Crying	.03	-.03	.07	-.00	.05	.02						
Attn. to Caregiv.	.10*	.10*	.14**	.11*	.08*	.10*	.18**					
Imitate	.29**	.15**	.29**	.22**	.14**	.26**	.01	.11*				
Current Usage	.31**	.01	.26**	.27**	.02	.20**	-.01	.18**	.22**			
Gesture	.30**	.13**	.14**	.18**	.15**	.13**	-.03	.10*	.23**	.33**		
Comprehen.	.17**	.19**	.03	.14	.24**	.09*	.09*	.09*	.11**	.15**	.19**	

Note: N = 288-479

* = $p < .05$
**= $p < .01$

APPENDIX VII: Intercorrelation Matrix for Independent Variables
D. Social-Emotional Cluster

	Marital Stat	Birth-order	Sib/Prb.	Pleases Parent	Maladj.	Therapy	Social Act.	Isolated Act.	Neg. Personal.	Positive Personal	Abuse	Relates Adults	Method Discip.	Behav. Problem	Relates Peers	Disc. Problem
Marital Stat.																
Birthorder	-.06															
Sibs/Problm.	.00	.26**														
Pleases Par.	-.05	.04	.03													
Maladjust.	.05	-.01	.03	.13**												
Therapy	.11**	-.02	.03	.01	.09*											
Social Act.	.00	-.04	.06	.07	-.10*	.02										
Isolated Act.	-.09*	.02	-.01	.08*	.00	.01	-.06									
Neg. Personal	.11**	-.10*	-.01	.06	.44**	.08*	-.01	-.01								
Pos. Personal	.03	.06	.05	.13**	.06	-.04	.02	-.00	.10*							
Abuse	-.02	-.01	.01	.41**	.17**	.02	.04	.12**	.08*	.02						
Relates Adlts.	.08	-.08*	-.09*	.05	.19**	.03	-.01	-.09*	.29**	.00	.09*					
Meth. of Disc.	.04	.05	-.06	.00	-.07	-.03	.04	.02	.01	-.07	-.02	.03				
Behavior Prob.	.01	-.05	-.01	.10*	.25**	.15**	-.08*	.08*	.16**	.00	.13**	.03	-.09*			
Relates Peers	-.01	-.03	.06	-.05	.23**	.19**	-.12**	.03	.21**	-.17**	.07	.15**	-.02	.30**		
Discip. Prob.	-.07	-.01	.06	.12**	.21**	.07	.02	.12**	.11**	.10*	.61**	.04	-.05	.27**	.13**	

Note: N = 365-623
* = p <.05
**= p <.01

APPENDIX VIII

Variables Included in Six Clusters for Age Cohort Analyses

Cognitive

I.Q.

Socioeconomic Status

Father's Occupation
Mother's Education

Physical

Hearing Loss
Medication
Mother's Illness
Birth Complications
Neurological Diagnosis
Number of Doctors Seen
Number of Special Tests

Language History

Use of Gesture to Communicate
Articulation Ability
Age of 2-Words
Attention to Caregiver
Abnormal Crying in Infancy

Social Emotional

Pleases Parent (# comments written in)
Method of Discipline
Enrolled in Counseling/Therapy
Prefers Isolated Activities
Behavioral Problem
Siblings with Behavior/School Problems
Behavioral Maladjustment Rating

Program Status

Reason for Termination
Final Recommendation
Length of Enrollment